For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex libris
universitatis
albertaensis

THE RATE LEVEL
IN
PUBLIC UTILITY REGULATION

Digitized by the Internet Archive
in 2018 with funding from
University of Alberta Libraries

https://archive.org/details/ratelevelinpubli00hans

UNIVERSITY OF ALBERTA

FACULTY OF ARTS AND SCIENCE

(Department of Political Economy)

A Thesis

THE RATE LEVEL IN PUBLIC UTILITY REGULATION

Submitted in partial fulfilment

of the

requirements for the degree of

Master of Arts

(Master's Program: six graduate courses in addition to this thesis)

by

Eric J. Hanson

University of Alberta,
Edmonton, Alberta.

March 31, 1946.

Thesis
946
#11.

ACKNOWLEDGMENT

Special acknowledgment is made to the members of the Department of Political Economy of the University of Alberta for the invaluable guidance they have given.

Indebtedness is also expressed to the Board of Public Utility Commissioners of the Province of Alberta for the use of its library facilities.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
PART I. THE BACKGROUND OF REGULATION	6
A. The Price Mechanism	7
B. The Problem of Control	12
C. The Nature of Public Utilities	19
1. Definition	19
2. The Characteristics of Public Utilities	20
a. Indispensable Service	21
b. Natural Monopolies	21
c. Stable Returns	24
d. Localization of Service	26
e. Specialized Plant Equipment	27
f. Kind of Labor Problem	27
D. The Scope of Regulation	29
1. General Considerations	29
2. Public Utility Regulation in Canada with Reference to Alberta	30
3. Legal Attitudes and Aspects	36
4. Economic Aspects	38
5. Administrative Aspects	39
6. Regulatory Tests and Criteria	40
PART II. PRESENT PROCEDURES	46
A. General Considerations	46
B. Valuation and the Rate Base	48
1. The Problem of Valuation	48
2. The "Fair Value" Doctrine and Value	50
3. Exchange Value	56
4. Methods of Rate Base Determination	59
a. Original Cost	60
i. Unimpaired Investment	60
ii. Actual Cost	61
iii. Prudent Investment	63
b. Reproduction Cost	66
c. The Split Inventory Method	69
d. The Index Number Method	69
e. Mixed Valuations	70
5. Depreciation	71
a. Depreciation in Valuation	71
b. Causes of Depreciation	74

	Page
c. Concepts of Depreciation	82
i. Impaired Serviceableness	82
ii. Fall in Value	83
iii. Difference in Value	84
iv. Amortized Cost	85
d. The Measurement of Depreciation	87
e. Depreciation Measurement as a Deduction from Cost New	88
f. The Straight Line Method	93
g. The Sinking Fund Method	95
h. The Reducing Balance Method	98
i. The Observation Method	103
j. Composite Depreciation	105
k. Appreciation	108
l. Accounting Procedure	109
m. Depletion and Depreciating Assets	115
n. Conclusions	119
6. The Elements of Value	120
a. Physical Property	121
b. Working Capital	125
c. General Overheads	127
d. Nonphysical Elements	129
i. The Going Concern Theory	129
ii. Franchise Value	133
iii. Good Will	135
iv. Other Intangibles	136
v. Going Concern Value	136
C. The Rate of Return	144
1. General Considerations	144
2. Definition and Concept	145
3. The Capital Structure	147
4. Risk	149
5. Incentives to Efficiency under Regulation	154
6. Taxes	158
7. The Rate of Return and Procedure	161
D. Operating Expenses	166
E. The Rate Structure	168
F. The Rate Level and the Law	173
G. Canadian Rate Cases	180
PART III. SUGGESTED PROCEDURES	182
A. Alternative Determinants of the Rate Base	182
B. A Comparison	186
1. Systematic Administration of Rates	186

	Page
2. Protection of Investors and Consumers	189
3. Fin ncial Stabilization	192
4. Provision for Capital Needs	196
5. Incentive to Progress	202
6. Flexibility of Rates and Stability of Return	204
7. The Institution of a Fixed Rate Base	205
C. The Function of the Rate Base	208
D. Alternative Cost Approaches	223
E. Value of the Service	232
F. Yardstick Regulation	233
G. Public Ownership	235
CONCLUSIONS	236
BIBLIOGRAPHY	242

THE RATE LEVEL IN PUBLIC UTILITY REGULATION

INTRODUCTION

The economic organization of our society is based upon the institutions of private property and free contract. An automatic regulator of prices, an arbiter of the apportionment of goods and services, is the force of competition, operating through the principle of substitution whereby alternative apportionments are made so as to equalize the value of marginal returns.[1] This automatism is implicit in private property and free contract; any arbitrary or conscious regulation of the apportionment of goods and services will encroach upon these two institutions. Yet such regulation and control is being undertaken in various ways throughout the whole structure of our economic organization. Why is such regulation undertaken?

Speaking generally, the answer is that competition is not a fully effective force; it is imperfect and

---

1/This is expressing the idea of competitive adjustment with extreme brevity. Most of the books dealing with general economic principles explore the concept with sufficient thoroughness. For a more abstruse discussion of it, see Knight,F.H., Risk, Uncertainty and Profit, Chapters III-VI.

monopolistic in nature throughout the economic structure of society; hence, the principle of substitution is not fully operative, and the ensuing rigidities in the apportionments of goods and services prevent the equalization of marginal return values. The physical conditions of production and technological advances are among the primary determinants of the nature of competition. The purpose of regulation is to attain as far as possible the results that would be secured under perfect competition, but the methods of regulation do not necessarily aim to reproduce conditions of competition. Such regulation becomes interference with private property and free contract which are individualistic institutions; yet, in the absence of completely automatic processes the latter cannot lead to maximum economic benefits to society as a whole.

One field in which considerable control has been exercised for many years is in the realm of public utilities. Exactly what constitutes a public utility is a moot question. It is pointed out that a public utility is an industry "affected with a public interest", but so are all industries in varying degrees. One is tempted to say that public utilities are those industries in which the determinants of competition and

substitution are such that noncompetitive practices and results become evident to consumers, or such that the competitive practices are of the cut-throat variety, making the conditions of production and sale unbearable for producers. The two major groups which have so far been brought under regulation are,first, the common carriers, such as steam and electric railways, and ferry, express, and motor transport companies; second, gas, electric, water, telephone, telegraph, and street railway enterprises. The industries of the second group are termed the public utilities in common parlance, and it is in this restricted sense that the term public utilities will be used here.

The prime concern of this discussion is with the determination of the rate level for public utilities. Rate level determination is the major problem in public utility regulation, and it is proposed to survey the procedures used. The problem is an important one from a broad point of view; extensions of industrial control are demanded increasingly, and the lessons of public utility regulation should be of value in controlling other industries.

The rate level needs to be distinguished from the rate structure. The former has to do with the general

adequacy of rates in meeting costs; the latter deals with the particular and individual rates which can be charged to meet costs. The rate structure has received the major share of attention in dealing with common carriers, while the rate level has been the focus of controversy in dealing with the public utilities.[1/]

The rate level in general, its economic and legal bases, and the procedure involved in its determination are the central theme of this discussion. The problem is introduced in Part I where the question of value is dealt with, and the concept of "fair value" is introduced. In Part II, methods of measuring "fair value" are outlined, and the fundamental cleavage between original cost and reproduction cost is indicated. Depreciation is inherently part and parcel of valuation, and therefore deserves the relatively large share of attention given to it here. It raises so many problems that despite the space accorded to it in the discussion, it is by no means adequately treated. Valuation procedures and the elements of value are dealt with next.

No discussion of the rate level is complete without a consideration of the rate of return. This rate

---

1/ As pointed out, the term public utilities is being used in its narrowest sense.

is based upon the valuation made, and adjustments which are not made in the rate base may be made in the rate of return. Accordingly, the determination of the rate of return is discussed next, followed by a brief consideration of the place of operating expenses in the rate level. The nature of rate structures is also dealt with very briefly, and in a very general way.

In Part III, attention is given to alternative methods of rate base determination in the light of suggested standards of regulation. The function of the rate base itself as a determinant of rates is examined. Some alternative procedures by which the rate base would occupy a less prominent position in rate making are finally presented.

PART I

THE BACKGROUND OF REGULATION

A. THE PRICE MECHANISM

The production of goods and services in our society is largely governed by market conditions. Market prices reflect consumer preferences. In a society of private property and free contract, prices are largely the result of the exercise of the rights of property and contract by individuals and groups of individuals. Since millions of individuals are involved, the price adjustments that take place are often called automatic.

However, price adjustments are not necessarily automatic. Prices may be adjusted by some authority set up by society. Thus, if it is felt that automatic price adjustment is not in the best interests of society, steps may be taken to regulate prices. The problem of controlling prices arises when the competitive process is not functioning; when the market condition is one of monopoly. The competitive process is implied under free enterprise as a regulator of prices, and as the instrument which allocates resources economically among competing ends, equating costs and prices. 1/

Free contract and freedom of property do not in

1/ Pure competition equates costs and prices at the lowest point of the cost curve. This is what is meant here. Monopolistic competition also equates costs and prices, but not at the minimum point of the cost curve.

themselves guarantee automatic price adjustment. Fundamental factors peculiar to the production of many commodities hamper the competitive process, and market conditions may be such that it is possible for one or a few producers or sellers to manipulate the prices and the volume of production of the goods they produce or sell. 1/

The basic condition leading to such control of price is the increasing use of capital goods in the process of production. In a handicraft economy investment is relatively small; it is relatively easy for producers to enter and to leave an industry, and hence there are many producers in any given industry. Under the monopolistic competition of modern society, the condition of many producers may also be present, and each producer has but little control over price. But the tendency to larger capital investment in order to secure economies of scale has rendered entry into and withdrawal from an industry more difficult. Thus indivisibilities mean that large sums must be invested; these sums can be raised only by a relatively few. These few

---

1/ Monopoly, monopolistic competition, and pure competition are concepts useful in classifying enterprises from the point of view of market conditions. See Chamberlin, E.H., The Theory of Monopolistic Competition, Chs. 1,2,4.

are usually corporations, institutions which have developed with the growing requirement for large investment.

The competitive process is deemed desirable since it tends to push production to the lowest cost point of the cost curve, thus establishing the most economic use of resources. Excess capacity will develop only from the irrationality of producers, or from sudden demand or cost changes. This excess capacity, as it manifests itself in any particular industry, is temporary, for competition leads to a continual shifting of resources. When monopolistic elements appear, the competitive process is interfered with, and the presence of excess capacity and idle resources becomes a more permanent phenomenon throughout the economic structure. 1/

The difference in results arises from the elasticity of the revenue curves. Under pure competition, the revenue curve of the firm is perfectly elastic, and therefore, if rational behavior is assumed, the revenue curve will, in the long run, be tangent to the cost curve at the minimum point of the latter. Wherever monopolistic elements are present, the revenue curve of the firm is less than perfectly elastic, 2/ and therefore

---

1/ Chamberlin, E.H., op.cit., pp.104-109

2/ That is, its slope is less than zero, assuming that it slopes downward to the right.

cost and revenue cannot be equated at the point of minimum cost. Attempts of the firm to reach this point on the cost curve achieves results equivalent to a change of scale, but tangency of the revenue curve with the cost curve at the lowest point of the latter is not attainable. 1/

1/ The conclusions above can be illustrated by means of diagrams. Assume that we have two firms with the market conditions portrayed below in Figures 1 and 2. In both cases the long run equilibrium is achieved at the point where the marginal revenue curve intersects the marginal cost curve. In both diagrams, PR is the average revenue curve and it is also the marginal revenue curve in Figure 1. PR is the marginal revenue curve in Figure 2. In both diagrams, CC is the average cost curve, and MC is the marginal cost curve.

In Figure 1, the curves all intersect at the equilibrium point E. The output is OQ, and the price is OP. In Figure 2, it is seen that the output OQ_1 is smaller than OQ in Figure 1, and the price OP_1 is greater than OP in Figure 1.

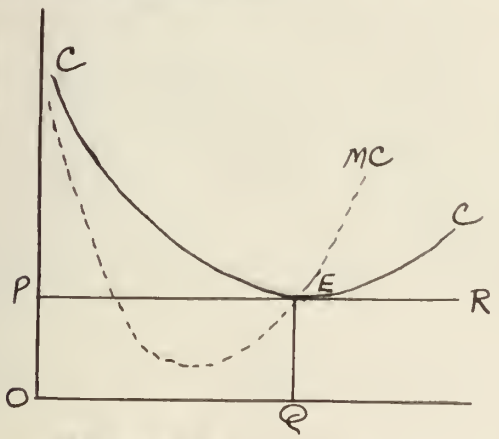

Figure 1
Purely competitive condition

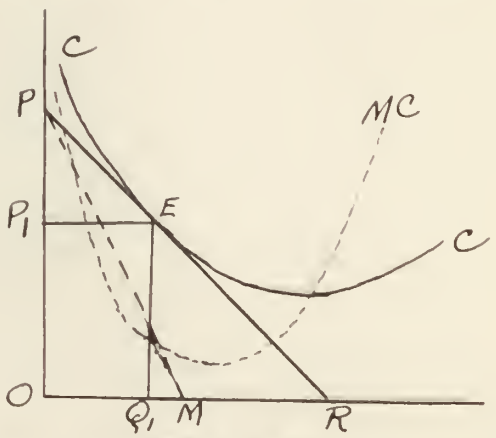

Figure 2
Monopolistic condition

The reason for the elasticity differences in the revenue curves in the given cases is that under pure competition the firm exerts no influence on price, while wherever monopolistic elements are present, the firm does exert some influence on price.[1] Under either of the conditions discussed, the firms try to maximize revenue, but the results as to price and output differ.

1/ Under pure competition, there are many sellers of a homogeneous product; under the latter condition of monopoly, there may be many sellers of differentiated products, or few sellers of a homogeneous product, or indeed only one seller of a product for which substitutes are not readily available.

B. THE PROBLEM OF CONTROL

The ultimate problem of control is to secure the optimum use of resources. This condition is achieved when the total aggregate of wants at any given time is satisfied by means of the minimum total aggregate of efforts possible at the time. If perfect competition prevailed throughout the economy the condition would be achieved. 1/ If competition is less than perfect, that is, if there are imperfections in knowledge and mobility of resources and so forth, interference and regulation are conceivable means of overcoming these imperfections. However, it is the emergence of monopolistic elements which renders society conscious of the need for control.

Under monopolistic competition where entry is unrestricted, cost and price are equated, but at a point where the cost is above the minimum. Were such a condition to prevail throughout the economy, society would sense some need for control. It seems that control under such conditions would have to be in the direction of homogenization of product, a procedure

---

1/ Pure competition includes only the necessary condition of many sellers of a homogenous product. Perfect competition includes pure competition, but also assumes the absence of frictional elements such as imperfectionss in knowledge and mobility of resources.

which would limit seriously the choices open to consumers. The implications will not be explored here. Where entry is restricted, price and cost of product will not coincide; that is, the revenue curve of the individual firm is not tangent to the cost curve. Here control would involve removing entry conditions; if not, steps may be taken to force the firms involved to utilize capacity more fully. This condition may be relevant in public utility control where there exist substitutes for the public utility service. 1/

Next, consider the cases where the product is homogeneous. Under monopoly there is only one seller who consequently has an overwhelming effect upon his revenue curve. Here the producer does not have to consider the effects his actions may have upon competitors, and ultimately upon himself. 2/ If the product produced is desired intensely by society, society will become acutely conscious of the need for control. Control would involve regulation of price and output at the point most desirable to society as a whole. A public utility for whose service there are no readily available

---

1/ This is conceivable where entry is free also, but there the problem of control is not acute.
2/ This can hold too where monopolistic competition with restricted entry exists.

substitutes may have a monopoly.

Another condition may obtain, however. This is the condition of oligopoly. Here there are few sellers of a homogeneous product. Each producer is faced with the consequences his own actions with respect to price may have ultimately upon himself. 1/ Consequently, price equilibrium becomes indeterminate. Indiscriminate price-cutting on the part of the producers leads to cut-throat competition, and ultimately to the elimination of the weaker producers so that monopoly finally obtains. Agreement among the producers leads to the establishment of higher prices than those that would obtain otherwise. Probably the public utilities afford a typical case of oligopoly. Early attempts to foster competition among the utilities led to the emergence of single firms as monopolies. Regulation of these monopolies still had to consider the amortization of the costs of property abandoned in the process of consolidation. Where agreements existed, regulation also became inevitable. In short, oligopoly is a forerunner of the condition of natural monopoly to be considered later.

1/ See Chamberlin, E.H., op.cit., Chapter III, for a discussion of duopoly(two sellers) and oligopoly.

Monopolistic conditions are essentially phenomena of the productive aspect of the economic system, but they tend to manifest themselves most obviously in the distributive aspect of the economy. Consequently, the emphasis of control may be put upon the mere restriction of profits, instead of upon the more basic considerations of production, such as control of the flow of productive resources. The problem is complicated by the rigidities the institution of private property, constitutionally protected, may produce in distribution. In the last section of this thesis, this question will be discussed. At this point, control will be considered from a theoretical and more from an administrative viewpoint.

Granted that the problem of selecting the industries to be controlled is solved, and this is by no means simple in view of the prevalence of monopolistic competion in varying degrees, the question of method of control remains. The methods used have to be socially approved; that is, they must be compatible with the institutions and customs of the society concerned. This involves a balancing of interests, and a compromise with the institutions of free contract and private property in a capital-

istic society. The ultimate aim of regulation is to secure optimum use of resources. This is not secured if only one party is satisfied, and it is not secured if only short-range considerations are allowed to prevail.

Control is generally undertaken in the interests of consumers. But the problem of control is not solved merely by the superficial satisfaction of consumers; in the long run, if goods and services are to be forthcoming in an economical way, the investors must also be considered. In order to secure funds for a controlled enterprise, regulation has to aim at living up to the reasonable expectations of the investors. The law provides for the protection of investors by its emphasis upon prevention of confiscation without due process. The factors of risk and alternative opportunities are determinants of the reasonable expectations of investors.

Enterprises selected for control are non-competitive and are therefore not subject to the risks of competition. Consequently investors cannot reasonably expect a return for a risk to which they are not subject. But they are entitled to a return commensurate with all the other risks, the risks of

physical and functional deterioration of the investment. Further, this point can be stated in terms of alternative opportunities. If returns in nonregulated industry seem higher, than in regulated industry, all other things equal, investment will flow to such industry. Thus, the return to investors in regulated industry has to be high enough to attract investment.

A difficulty which appears in regulation is the achievement of flexible administration to attract capital at the lowest price possible whenever it is needed. Regulation has a tendency to set a fairly rigid return, which may or may not be earned depending upon the fortunes of the industry, and it is apt to remain in force for some time because of the administrative difficulties of varying it frequently. This will make for a stable return, subject to the qualification of risks, which is satisfactory to bondholders and preferred stockholders. It is the return to common stockholders or the more speculative investors that presents a problem in administration. Financing by means of bonds and fixed dividend stock increases risk, and therefore increases the cost of further financing. Thus there are times when capital

can be most cheaply obtained by the issuance of common stock. This question will be discussed further later.

Again there is the question of the treatment of existing investors and future investors. The former have to be dealt with according to reasonable expectations which are determined by the risks which exist after regulation has been undertaken. The latter invest with full knowledge of regulation, but administrative consistency may be part of their reasonable expectations.

Consumers consist of more than one class also. This is recognized where discrimination is exercised in rates. But there also arises the broader question of present and future consumers; whether rates shall be high now, or whether the apportioning of fixed costs in the rates shall be extended over a longer period of time.

The problems raised here are considered in more detail in connection with the specific problem of public utility regulation which is the concern of this discussion. The questions met in public utility control may be relevant to questions which arise in the control of other industries, and indeed, in policies of control in general.

C. THE NATURE OF PUBLIC UTILITIES

1. Definition

In the broadest sense, public utilities are enterprises "affected with a public interest." Since most enterprises can conceivably be said to be "affected with a public interest," the concept has to be narrowed. Actually, an enterprise becomes a public utility when the law defines it as such. Thus a public utility is a business which by virtue of its peculiar public interest has become subjected to intensive and detailed regulation by a legislating body. The chief groups of businesses which have so far been brought under control are those providing transportation, communication, and storage services. Railroads, telegraph and telephone companies, warehouses, grain elevators, milk distributors, gas, electricity, and water distributors are the chief examples.

The term public utilities has become even more restricted in usage, for it has come to mean businesses providing electricity, gas, water, telephone, and street railway services. This is the sense in which the term will be used henceforth, and it is with the rate level in these businesses that this thesis is concerned. Railroad rate regulation, for example, is

a comprehensive field in itself, though closely related to and furnishing parallels with and precedents for the regulation of the public utilities. The public utilities, however, differ from the railroads in the greater stability of demand for their services, and in the more localized character of their operation. Also, the rate structure is the core of regulatory procedure in the case of the railways, while the rate level is the centre of attention in public utility regulation. Railroad rates it may be noted, have an all-pervading effect upon the whole economy, while public utility rates are of more local significance. This is a distinction, however, which should not be stressed unduly.

2. The Characteristics of Public Utilities

The characteristics of public utilities need to be considered because they illustrate why regulation has been undertaken, and because they furnish the background for an examination of the regulatory process. 1/

1/ For a more exhaustive treatment of this topic than that presented here see Bigham, T.C., and Jones, E., Principles of Public Utilities, Chapter II; Nash, L.R., The Economics of Public Utilities, Chapter II; Koontz, H.D., Government Control of Business, pp. 292 - 296.

(a) Indispensable Service

Public utilities provide services which are indispensable to modern existence. Such services could not be discontinued even for a day without causing innumerable inconveniences and dislocations from the standpoints of both health and safety, and economic and social welfare generally. Hence, even if the competitive process were effective in providing these services, some regulatory measures would be justifiable to ensure continuous service. In addition, services must be adequate both as to quantity and quality. Finally, unreasonable discrimination in giving the service would lead to dissatisfaction, and, in the case of industrial users, discrimination between users of a service, can put businesses on an uneven footing, helping some, and hindering others. 1/

(b) Natural Monopolies

Public utilities are natural monopolies. Here arises another prime reason why regulation is undertaken. A natural monopoly is an industry which

---

1/ Koontz, H.D., op.cit; p. 292

by the nature of its capital equipment and capital turnover is more efficient if only one firm exists in the industry than if several competitive enterprises exist in the industry. Indispensable service is closely linked with the monopoly situation, for a true monopoly is one which provides goods or services satisfying a universal want, one for which there are no substitutes. A natural monopoly arises here because a large capital outlay is required to provide adequate service. This heavy investment prevents ready entry into the business, and therefore hampers the competitive process. If several concerns do enter, they are driven to cut-throat competition by the condition of high fixed charges.

In the case of the public utilities, there is not room for several competing concerns in the same field because of the immobility arising from the high capital turnover, and also because duplication of equipment becomes inconvenient to society at large. 1/

1/ The duplication of street car tracks, gas and water mains and pipes, telephone poles, etc., would clutter up cities, towns, public highways, and streets, and hamper activities in general. Also, one can readily see the inconvenience, if not impossibility, of having several telephone systems.

The capital turnover ratio is relatively small in comparison with most businesses. Generally it takes four or five years for most public utilities to turn over their capital. 1/ Thus fixed costs are very important. This leads to a decreasing cost condition with lowered cost per unit of output the greater the output. 2/ A large plant, can thus utilize its capacity more fully than a large number of competing plants could. The nature of the demand for services and goods varies too, for there are peak demands which recur daily, weekly, seasonally, and annually. This necessitates the construction of facilities to meet such demands. Under such conditions several competing plants would be operating with much idle capacity, and hence costs would be higher. A monopoly here also offers less risk to investors, and it can therefore obtain investment capital at lower rates than could several competitive enterprises operating in the industry. Finally, competition would be ineffective

---

1/ Guthmann, H.G., The Analysis of Financial Statements, pp. 331 - 332. See also Bigham and Jones, op.cit., p. 93.
2/ This, of course, is subject to the qualification that increasing costs will eventually arise. Diseconomies finally make themselves felt. For a discussion of this topic in terms of the market process see Buchanan, N.S., The Economics of Corporate Enterprise, Chapter II.

anyway, for the cut-throat competition that would ensue from idle capacity and decreasing costs would result in the emergence of one dominant firm in the end. Consequently, since competition is not feasible, and since public utility services are indispensable, regulation has to take the place of competition.

(c) Stable Returns

Public utilities receive relatively stable returns. This follows from their monopolistic position, a position which is natural, and also a position maintained by law after they are regulated. Rates are under government regulation, and the courts provide for protection from confiscation without due process of law. Entry, too, is usually restricted by regulation. Without such regulation, a firm might have to meet cut-throat competition engendered by new entrants into the field; the ensuing competition would result in the elimination of all but one firm in the end. The competitive risk is thus reduced. Further, since the services are indispensable, the demand for these services is relatively stable and inelastic. The high proportion of fixed costs renders its costs less subject to price changes than those of many other industries, at least in the short run.

It must be noted that regulation does not guarantee that a specific return will be earned. No matter how many protective cloaks are thrown about a rate, these are of no help if the rate cannot be earned. Stability of return is affected here as elsewhere in industry by advancing technology and varying business conditions which lead to shifts and elasticity changes in supply and demand. These are the most significant risk elements, and they also give rise to most of the controversies in regulation, especially in connection with valuation and depreciation.

The greater the amount bought by industry in relation to the amount bought by domestic and residential users, the more subject is the utility to instability of income. This tendency is accentuated if the utility operates in a locality in which there is a single large industry to which the utility sells its services. Also to be noted in this connection is the likelihood of competition arising in servicing industry. A manufacturing firm may for example, set up its own electric plant, if it deems this more economical and convenient than buying its electricity from an electric power company. Nevertheless, during the pre-war depression, public utilities on the whole

earned stable returns because of the character of the demand of residential and small commercial users. The street railways met great difficulties, however, difficulties which arose from technological changes giving rise to competitive substitutes, 1/ as well as from the general slump in business activity.

One should probably note the factor of the maturity of an industry here. Steam and electric railways and street railways seem to have become mature industries, and if anything, are declining. It seems unlikely that they can earn a stable income in the future. As electric power companies are increasingly expected to make extensions to serve less profitable and more marginal areas, they are more likely to become subject to instability of income.

(d) Localization of Service

Public utility services tend to be localized. Some exceptions such as long-distance telephone service and long-distance transmission of electricity and gas, may be noted. But local telephone calls far outweigh long-distance calls, and transmission of power is subject to increasing costs. Localization

---

1/ E.g. automobiles, taxis.

means that many of the costs of the industry are subject to local condition - climate, sources of supply, markets, labor conditions, and so forth. This makes it impossible to set up a standard cost basis for all public utility companies in a country, should a central government wish to do so. Localization also makes the utility dependent upon local industry if such an industry purchases a large proportion of the utility's output. The degree of localization is a significant risk element which has to be considered in determining the rate of return.

(e) Specialized Plant Equipment

Public utilities operate with specialized plant equipment. This feature is associated with natural monopoly and immobility of resources. Once installed, public utility equipment can seldom be put to economical alternative uses. This is an important risk factor and is related to obsolescence and changes in consumer demand.

(f) Kind of Labor Problem

Public utilities are not faced with a labor problem of any magnitude. 1/ Labor cost constitutes

---

1/ This is in contrast to the railways which have a major type of labor problem. Street railways, too, have a significantly large labor problem.

about one-fifth of the gross revenues of most gas, electric, and water companies. Telephone, telegraph, and street railway companies have higher labor costs. Most employees are skilled. Despite this, unionization is fairly recent. Employees think twice too before going on strike, for strikes in public utilities are highly unpopular with the public. Also, employees cannot readily transfer their skills to other occupations because of the localization and monopolization of the industry generally. Consequently, labor turnover is small.

In summary, public utilities are concerns characterized by indispensable service or paramount public interest; natural monopoly with high capital requirements, decreasing costs, and slow capital turnover; relative stability of return; localized service; specialized plant equipment; and, a favorable labor situation.

D. THE SCOPE OF REGULATION

1. General Considerations

Public utility regulation of both services and rates is undertaken. The regulation of services includes entry into service, extension of service, abandonment of service, service discrimination, and standards of service. The major concern here is with rate regulation, though the question of service must necessarily be raised in considering certain aspects of rate regulation. 1/

The scope of rate regulation varies in different states and provinces. In general there are certain uniformities. Thus, the law provides that rates be just and reasonable, that rates shall not be unduly discriminatory, and that schedules shall be filed and adhered to. Nearly all regulation of rates is done through commissions appointed by legislatures. These commissions have the power to investigate a company of their own accord or upon receiving complaints as to the rates charged by the company in question. Some legislatures lay down specific methods to be followed. There is a growing tendency,

---

1/ See Koontz, H.D., Government Control of Business Chapter 14, for a summary of the regulation of service.

too, to place more power in this respect in the hands of commissions. The scope of rate regulation will become clearer as present procedures of rate regulation are discussed.

2. Public Utility Regulation in Canada with Reference to Alberta

In Canada, regulation of public utilities tends to follow the lines adopted in the United States. Provincial legislatures enact statutes, and appoint commissions to administer them. In contrast to events in the United States, there seems to be less tendency to resort to court litigation, although appeals are sometimes made by companies to appellate courts. 1/

Here it is proposed to outline regulatory procedure in the Province of Alberta for the following reasons: first, the procedure followed is, in general, similar to that of other provinces in Canada, and various states in the United States, thus serving to indicate the methods generally followed on the North American continent; second, the question is of local interest, especially since rate cases are now

---

1/ Wainwright Gas Company vs. Wainwright, Appellate Division of the Supreme Court of Alberta, 1930, 3 W.W.R. 337; is an example in Alberta. Another is Northwestern Utilities v. City of Edmonton, 1929, S.C.R. 186.

under consideration, and more cases are likely to arise. There are two acts in force in Alberta, The Public Utilities Act, Revised Statutes of Alberta, 1942, and The Natural Gas Utilities Act, 1944. The latter lays down more specific regulations in dealing with the question of natural gas, a question which has become particularly acute in the Turner Valley field.

The Public Utilities Act specifies the following industries as public utilities: telegraph and telephone service; railways and street railways; water, heat, light, and power systems; production, processing, and wholesale and retail distribution of gas; and, production and distribution of fluid milk. 1/ Three members appointed by the provincial cabinet constitute the Board of Public Utility Commissioners, and each member holds office for ten years, subject to the pleasure of the legislature. 2/ One of the three members is the chairman who holds this office as long as he is a member of the board. Provisions are made for the appointment of administrative staff, the appointment of experts, remuneration of officers,

---

1/ Section 2(h).
2/ Section 3.

and places of hearings. 1/

The Board's powers are set forth generally in Section 21. In addition to its power "to deal with public utilities and the proprietors thereof", 2/ the Board must deal with municipal borrowing, municipal finances otherwise, separation of land from an urban municipality, tax arrears compromises, plans of subdivision, and it has to administer The Securities Act. 3/ Only the powers as to public utilities, dealt with in Part II of the Act, will be outlined more specifically here. The practice and procedure essentially follow legal and court procedures. 4/ The orders of the Board as to conditions, compliance, enforcement, and appeals to higher courts are outlined in Sections 40 to 50 inclusive.

In Part II of the Act, the powers as to public utilities are outlined. The regulations in Part II apply to all public utilities owned by or controlled by the provincial government, to those owned by corporations or companies under provincial jurisdiction, and to railways and street railways whose owners are subject to provincial jurisdiction except municipal

---

1/ Sections 4 - 19 inclusive.
2/ Section 21,(a)
3/ Section 21,(b) to (j) inclusive.
4/ Sections 25 - 39 inclusive.

owners. Municipally owned utilities are not included unless a by-law is passed by an order-in-council to include any such utilities. 1/

Powers as to milk and food products are outlined in Sections 53 and 54. "The Board shall have . . jurisdiction upon its own initiative or upon complaint in writing to inquire into any matter relating to the production, supply, distribution or sale of milk." 2/ Similar powers are given to deal with any food product produced in Alberta if the provincial government directs the Board to use them in connection with any food product. 3/

Jurisdiction and powers of the Board in respect of "public utilities" are outlined in Sections 55 to 70 inclusive. These include such matters as investigation of complaints of excessive charges, power to increase or decrease rates, jurisdiction over natural gas contracts, grants of permission to use roadways, right-of-ways, extensions of service, natural gas investigations, general supervision of utilities, valuation of property, filing of schedules,

---

1/ Section 52
2/ Section 53 (1)
3/ Section 53 (3)

safety regulations, rate fixing, standard classifications, railroad connections, accounting procedure, 1/ span wires, and statements required from corporations. Restrictions on the powers of proprietors of public utilities are outlined in Sections 71 to 91 inclusive.

A few specific points now need consideration. First, no definite criterion of valuation procedure is outlined. In dealing with valuation the Act states that the Board shall have power "from time to time to appraise and value the property of any public utility whenever in the judgment of the Board it shall be necessary so to do, for the purpose of carrying out any of the provisions of this Act, and in making such valuation the Board may have access to and use any books, documents or records in the possession of any department or board of the Province or any municipality thereof". 1/ Second, the decisions of the Board are final, subject to appeals to higher courts. Third, an interesting point is the provision that the Board shall not raise rates against the wishes of the public utility concerned. 2/

1/ Section 66, (d), (iv) and (vi)
1/ Section 65, (b)
2/ Section 67.

The Natural Gas Utilities Act, 1944, sets out specific procedures to be followed in dealing with natural gas. A Board of two members administers the Act. The chairman is also the chairman of the Public Utilities Board. The other member is the chairman of The Petroleum and Natural Gas Conservation Board. One of the purposes of this Act seems to be to co-ordinate regulation and conservation as applied to natural gas. Part II of the Act applies to all public utilities, and is very similar to Part II of the Public Utilities Act. The most significant point to be noted as relevant to the subject of this thesis is that rules for the guidance of the Board in determining the value of property have been included, and the subsection dealing with this reads as follows:

"In fixing and determining prices or values of any real or personal property for any of the purposes of this Act the Board shall not be bound by the price paid by the owner or the replacement cost or by any book values however established by the owner for such property, but may adopt any basis or formula which to it shall appear just and reasonable, and in particular and without restricting the generality of the foregoing the Board in fixing such prices or values shall determine the just and reasonable allowance for depreciation and in so doing may take into account depreciation already taken by the owner or any antecedent owner of such property." 1/

1/ Section 49, (2).

The provision seems to leave the Board much leeway in dealing with valuation and the rate level. Certainly there is no obligation to follow the "fair value" doctrine in Smyth v. Ames as in the United States, and the Board is free to adopt any formula which appears "just and reasonable". There is a question here whether the legislature should lay down a specific valuation formula; this could facilitate greater uniformity and consistency in valuation. The Board has used the reproduction cost method in a recent case, but has not committed itself to this method as permanent one. 1/ It may be noted here that in recent cases in British Columbia and Nova Scotia, original cost was favored. These cases will be discussed later.

3. Legal Attitudes and Aspects

The problem of regulation of public utilities operated by private enterprise was first faced by the American courts during the last half of the nineteenth century. The courts found first that they had to define the concept of what constitutes a public utility, and second, after such definition,

---

1/ An investigation by the Board of Public Utility Commissioners into the rates charged by the Valley Pipe Line Company Limited, Order No. 10000, File P.U. 4871.

that methods and procedures of regulation had to be determined. In the final analysis, the two lead to the basic problem of regulation of prices and service. Such regulation means interference with private property and free contract. This gives rise to various considerations of justice to the parties concerned. The prime concern of the courts during the early period of regulation was with the protection of private property, to prevent confiscation without due process of law. The courts defined justice in terms of the "fair value" and "fair return" doctrines in the classic case of Smyth v. Ames (1898). 1/ These doctrines are very general concepts capable of broad interpretation. The application of these doctrines has come to mean the weighing of each case on its own merits, all relevant elements being given due consideration. The fair value doctrine developed out of the law of eminent domain which provided the only available precedents at the time of Smyth v. Ames.

As a test of confiscation the fair value doctrine has proved unsatisfactory. The lack of definite criteria has led to confusion and conflicting decisions.

1/ 169 U.S. 466, 545 - 546.
See Bigham and Jones, Principles of Public Utilities, pp. 191 - 192.

One writer feels that the concern of the courts should be simply to prevent grossly unfair treatment of investors. 1/ Present procedures, involving the weighing of innumerable elements peculiar to each case have led to uncertainties and inconsistencies in regulation.

The attitude of the courts toward public utilities varies too with the times. The philosophy which formed the basis for the New Deal policies in the United States during the 1930's reflected itself in court decisions regarding public utilities. During this period greater emphasis began to be placed upon the consumers' interests, a trend which is still continuing. 2/

4. Economic Aspects

The economic aspects of rate regulation have to do with the effects upon society of any interference with the institutions of private property and contract. Regulation is undertaken in order to prevent exploitation of the consumer, to insure that

---

1/ Bonbright, J.C., The Valuation of Property, page 1155. This question of legal attitudes and procedures will receive more detailed attention later.
2/ Koontz, H.D., op. cit., Chapter 13. This gives a summary of the attitudes of the courts during the last seventy years.

the latter does not have to pay rates which are supposedly above the competitive level. At the same time, the effect of the regulated portion of society upon the unregulated portion has to be considered. In the end, the economist has to concern himself with the problem of distribution of resources, goods and services. When rates are compatible with competitive costs of similar services, and returns to investors are equivalent to those of similar risk elsewhere, the question of distribution of resources is solved.

The great difficulty here is to find satisfactory tests of the economic success of regulatory policies. In practice, regulatory policy from the economic viewpoint becomes a matter of supplying inducements to investors in keeping with consumer interest, and of supplying incentives to efficient management so that adequate service is supplied to consumers at the lowest possible rates. The problems that arise are indicated in the discussion of present procedures.

5. Administrative Aspects

Administration involves executing the findings of economics and law. It is an important consideration in itself, for no matter what the economic and legal

merits of a policy, if it is complicated and expensive to administer, nothing is gained by such a policy. In the past, valuation procedure has been especially laborious and expensive, as well as indefinite and uncertain. Such procedure is not helpful in attaining either the legal or economic ends sought. Simplicity, definiteness, and consistency in administration go a long way toward creating confidence in the regulatory process on the part of the consumer, investor, and management.

6. Regulatory Tests and Criteria

The implications of rate regulation in a competitive economy in which the market mechanism regulates production and exchange have already been indicated. A variety of interests have to be reconciled; the regulatory process itself must meet with the approval of society, follow the trend of economic and political philosophy of that society, and harmonize with its institutions and laws. The basic problem, to be solved subject to the conditions above, is to provide efficient service at competitive rates. This means that the consumer interest is first. Such consideration of the consumer must be more than superficial; the

immediate satisfaction of a specific group of consumers is no criterion of the success of regulation in any given case; the economic allocation of productive resources is also implied, for only by such allocation is the ultimate consumer interest satisfactorily served.

One can see the difficulty, however, of determining what constitutes an economic allocation of resources. No really satisfactory solution can be advanced, especially in an economic society which, though competitive, is full of monopolistic practices and price rigidities. However, certain tests can be applied which may give some indication, over a period of time, of the success of regulation.

In the long run, the satisfaction of consumers in general can be observed. It is true that consumers always find lower prices acceptable, but the test of good regulation from this viewpoint would evidence itself in the lack of organized, continual pressure to reduce rates. Sporadic, individual attacks upon rates can be expected at all times.

The satisfaction of investors is evidenced by the readiness with which capital can be obtained.

This can be measured by the price at which the securities of utilities are bought and sold in the market. Such prices are direct reflections of the earnings permitted by regulation, and if securities sell readily at prices which are compatible with the risk elements involved, it would seem that regulation is working satisfactorily.

However, there are different types of investors too. It has been pointed out that public utilities as a group receive relatively stable incomes, subject, however, to risks which cannot be eliminated by regulation. There is little opportunity, therefore, for common stockholders to receive very large profits unless regulation is very ineffective or unless the company trades on its equity to the limit. The effectiveness of regulation may then be gauged from the return to the common stockholder. This is a delicate problem, however, because the common stockholders serve as an economic buffer for the other investors. He feels that he should be entitled to a return in keeping with the risks. Certainly, if the investors are to assume risks, some device has to be worked out by regulators in dealing with the common stockholders.

Another point to consider is consumer satisfaction with standards of service. The objective here becomes essentially one of incentives to management. It is conceivable that management, finding that it is no longer free to maximize returns, may tend to adopt indifferent and inefficient policies. This is not necessarily inevitable, for nonpecuniary motives are also present; nevertheless, one purpose of regulation must be to encourage efficient management. The underlying threat of outright state ownership of the public utility is present. What has been called the corporation problem is relevant here too. 1/ Primarily, this is a question of who ultimately controls a corporation, the management or the stockholders. In regulation how are incentives to be used? Are the common stockholders, who have voting privileges, to be rewarded for efficiency, or is management to be rewarded? That is, shall the common stockholders be rewarded for choosing efficient management, or shall management be rewarded for being efficient? This question receives further attention in the discussion of rate of return.

1/ Buchanan, N.S., The Economics of Corporate Enterprise, Chapter XV.

The efficiency of the administrative process is a requisite of good regulation. Past methods of regulation have tended to complicate administration, and countless controversies and involved procedures have led to much dissatisfaction with the regulation of public utilities. Inconsistent, unsystematic, complicated procedures have led to uncertainty, and have added to the risk of investment in public utilities, without at the same time satisfying consumers. Such uncertainty tends to increase the cost of obtaining capital, and hence increases rates. Much emphasis is placed by recent writers upon the importance of stable, direct, and systematic administration. 1/ It is argued that some of the flexibility made possible by weighing every case on all the "relevant" elements could be sacrificed, and more definite standards could be set up, and formulae could be used to settle many questions. Those who advocate the original cost basis of valuation tend toward this view. Greater routine, it is felt, would mean less uncertainty for both consumers and investors,

---

1/ Bauer, John and Gold, Nathaniel, Public Utility Valuation for Purposes of Rate Control.

and it is also felt that capital could then be obtained at lower cost. 1/ Whatever criteria are selected, they must meet the legal tests of confiscation. The courts would still be concerned with the protection of private property and contract. It can be seen that this could perpetuate present procedures. Recent cases, however, tend to indicate a tendency to consider giving commissions wider powers in the matter of rate regulation. The courts, it would seem, are beginning to find their present work in regulation burdensome and excessive. 2/

1/ Ibid., p. 371. Here the writers outline six criteria for the selection of a rate base, the fundamental step in rate making.

2/ In a recent case, the Supreme Court of the United States ruled that commissions are not bound by any single formula or combination of formulae in rate determination. This would seem to leave the road open for the adoption of consistency in valuation methods, and throws more responsibility upon commissions, a responsibility which commissions are somewhat loth to assume immediately since they fear court reversals of policies they might adopt which would constitute marked deviations from the "fair value" doctrine. See Federal Power Commission v. Natural Gas Pipeline Company, 42 P.U.R. (1942) 131, and Federal Power Commission v. Hope Natural Gas Company, 51 P.U.R. (1944) 193. The decision in the latter case confirms the decision in the former.

PART II

PRESENT PROCEDURES

A. GENERAL CONSIDERATIONS

The process of rate-making consists of several steps, the first of which involves finding the value of the property of the public utility. This value the courts have called the "fair value" of the property used by a public utility to give service to the public. More recently this value has been termed the "rate base", a much more satisfactory term since it avoids the use of the controversial word "value." The property items to be included are determined and valued, certain intangible items, are included, and the total value thus obtained is the rate base. Closely tied to this is the determination of depreciation, a subject full of controversies. Operating expenses have to be estimated too. Finally, a fair rate of return has to be determined, the rate being expressed as a function of the rate base. When "fair value", "fair rate of return", and operating expenses have been determined, the rate level has been set. Rate regulation by no means ends here, however, for the rate structure has also to be constructed once the rate level is fixed. The volume of sales for each particular class of service or each class of consumers, has to be estimated, and within

each class a scale of rates has to be drawn up.

The determination of the rate level is the core of public utility regulation, and occupies most of the time and energy of regulatory bodies. There has not been the same difficulties in dealing with rate structures as in the case of the railroads, where particular rates rather than the general level of rates have received major attention. Public utilities, need less complex rate structures than railroads because they usually give more localized service, and have fewer classes of services and customers.

The main concern here is with the rate level. Rate structures are given brief consideration insofar as they are related to rate level problems. 1/

1/ Graham, Willard J., Public Utility Valuation, (Univ. of Chicago, 1934), pp. 1 - 2. Graham outlines concisely the steps taken in rate-making for public utilities.

B. VALUATION AND THE RATE BASE

1. The Problem of Valuation

Valuation of the property to ascertain "fair value" in order to set a general level of rates has been and still is a controversial issue, and it has been the greatest problem in regulation. 1/ From the economic standpoint, the rate level must cover costs incurred by a public utility in its service to the public. This means that operating expenses, including depreciation and taxes, and the cost of obtaining capital must be covered. These are the costs that must be met by any successful enterprise. The regulation of operating expenses has received relatively little attention since such expenses are fairly easily determined, and since the services such expenses represent are largely bought in a competitive market. 2/ The treatment of taxes as operating expense, especially income taxes, has led to controversies, some economists and accountants holding that income taxes should be

---

1/ The extremely thorny subject of depreciation is an aspect of the valuation problem.

2/ Commissions have become more concerned about operating expenses with the growth of holding companies in the utility field. Goods and services are often bought from subsidiaries at inflated prices.

included in the rate of return. 1/ Depreciation is a cost which has to be met, but its determination is a highly controversial and difficult process. Finally, the cost of obtaining capital resolves itself into the allowance to investors of a return equal to that which they would receive by investing in competitive concerns of similar risk.

In the eyes of the law the rate level must not be so low as to lead to confiscation of property without due process of law, yet not so high as to exceed what the service is reasonably worth. The words "fair" and "reasonable" define the legal limits, but they are difficult to determine. The legal viewpoint is summed up by Bigham and Jones as follows: "... rates are reasonable when they permit a public utility company to earn a fair return upon the fair value of the property being used by it for the convenience of the public. The idea is that the fair value of the property of each public utility company should be ascertained; that the fair rate of return on the property should be determined; and that rates should be fixed at such a level as to provide the

---

1/ Bernstein, E.M., "Public Utilities and the Income Tax," Quarterly Journal of Economics, Vol. 45, 1930-31. pp. 529 - 535.

the sum thus found to reasonable". 1/ And to quote from the famous case of Smyth v. Ames: "On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth." 2/ The law thus demonstrates the constitutional and institutional bases implicit in rate-making. But the determination of "fair value" has bedevilled valuation cases since the turn of the century when regulation really began. Since that time the courts have handed down innumerable confusing and conflicting decisions in dealing with the ascertainment of "fair value". It is to the question of value and the "fair value" doctrine that we shall now turn.

2. The "Fair Value" Doctrine and Value

"Value is a word of many meanings. That with which commissions and courts in these proceedings are concerned, in so-called confiscation cases, is a special value for rate-making purposes, not exchange

---

1/ Bigham, T.C., and Jones, E., op. cit., pp. 192-193, in summarizing the findings of Smyth v. Ames.
2/ Ibid., p. 192. Smyth v. Ames dealt with railroads, but the case has served as a precedent for all cases dealing with public utilities.

value." 1/ This quotation points out the futility of trying to use our economic concept of value in valuation procedure. The word value is used in a variety of ways, and when we speak of valuation here we mean valuation for rate-making purposes. This valuation is distinct from valuation for taxation purposes (assessment), valuation for selling valuation for condemnation, or other purposes. In other words, it involves a particular kind of valuation procedure with particular aims distinct from the aims of other valuation procedures.

The difficulty of valuation for rate-making lies in the interpretation of "fair value". It has been argued that "value is value", no matter what the purpose of valuation is. 2/ The use of the term "rate base" for "fair value" has at least helped to rule out syllogistic arguments about the word "value".

To the courts, "fair value" means the value of a property as arrived at by a consideration of all

---

1/ Southwestern Bell Telephone, 262 U.S. at 310, dissenting opinion of Justice Brandeis and Holmes.
2/ In U.S.A., legal counsel for railroads and public utility companies at the time of the first world war, a time of many valuation cases in the field, argued that "value" was a "fact to be found" no matter what the purpose of valuation. The same argument recurs even today in valuation cases of various kinds. See Bonbright, J.C., Valuation of Property, pp. 5-6, and pp. 1105 - 1108.

the relevant elements. This position is set out as follows in Smyth v. Ames:

"The basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public, and in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property." 1/

It is seen that a number of elements are to be considered in ascertaining "fair value." Of the ones listed above "the probable earning capacity of the property under particular rates prescribed by statute" and "the sum required to meet operating expenses" have been ruled out in subsequent rate cases. The significant fact is that the courts reserve the right to weigh every case on its own merits, that no single formula or consistent method of valuation has been considered valid. Because of the varying decisions handed down by the courts, the whole question of rate base determination, and, indeed, all regulation of

---

1/ See Bigham and Jones, op. cit., p. 192.

public utilities has led to much uncertainty and doubt. This is what has led economists and jurists to advocate more consistent, standardized procedures.

The courts have clung to the fair value doctrine throughout, insisting upon weighing all the elements. The economists have wrangled over two bases of valuation, original cost and reproduction cost, while the courts have insisted that there is no conflict between these two methods; they maintain that the two are merely two of the elements to be considered. The economists argue that the two involve a choice between a shifting and a constant rate base; it must be one or the other. This dilemma is not admitted by the courts.

The cleavage arises from the differences between the concepts of value of economists and jurists. Legal thinking still admits the old justum pretium idea in the field of value; it stands convinced to a great extent that there is such a thing as intrinsic value. Hence the courts tend to feel that they can determine what the value of the property under consideration is. Economic thinking rejects any moral or ethical considerations in its concept of value. Fundamentally, economists think of exchange

value. Now, because the exchange value of business property is dependent upon the rate of earnings of the property, the exchange value is necessarily void of meaning in the case of properties whose earnings are subject to regulation. For if earnings are determined by a rate-making body, then the decision of that body is reflected in the market price. This price cannot be used as a basis for valuation; it is circular reasoning, a logical fallacy. Consequently, the economists say that it is impossible to arrive at the value of the property in question, and the best we can do is to determine an amount called the "rate base".

The difference of opinion between the jurists and the economists is expressed by Bonbright as follows: "So the courts refer to the determination of a rate base as one of 'finding out' what the 'present value' or 'fair value' of the property <u>really is</u>, whereas the economists refer to the same problem as one of <u>choosing</u> a proper rate base - of deciding how much the property should be permitted to be worth rather than of discovering how much it actually <u>is</u> worth." 1/ However, the same writer points out that the courts

---

1/ Bonbright, <u>op. cit.</u>, p. 1081.

have acted more in accordance with the economic viewpoint than they have admitted verbally. Their decisions, if not their arguments seem to indicate this. 1/

Ruling out value in the economic sense of the term, determination of the rate base becomes a matter of selecting the most equitable method of computing the rate base, subject to administrative expedience. The courts try to be equitable in determining the rate base; it is the neglect of expedience, and the costliness of present methods that are objectionable. A certain amount of uniformity and consistency would aid in achieving equity too. But as long as the courts interpret fair value as a composite of a number of "relevant elements", and as an expression of what the property is worth, instead of admitting that the rate base is only an expression of what you let the property be worth, economy and expediency in regulation will be sacrificed without guaranteeing equity to all concerned. Finding the fair value should be a matter of finding a method of valuation which results in expediency and economy in the regulatory process, and in equity to consumers, investors, and society at large.

1/ Bonbright, op. cit., p. 1081.

Actual and proposed methods are accordingly dealt with next.

3. Exchange Value

The fallacy of using exchange value in valuing regulated property has already been indicated. Some elaboration of the subject is justifiable.

Public utility properties are business properties. The value of a business property is the capacity of such a property to earn profits for whoever owns it. Such a value is arrived at in a free, competitive market, the bargaining of sellers and buyers centering around the earning capacity of the business. If the current rate of interest for a specific kind of security is 8%, and the annual net earnings average $ 8,000, the value of the property represented by the security is $ 100,000. This value is often referred to as capitalized value since it amounts to a capitalization of earnings.

To value a public utility upon this basis is, however, entirely fallacious. Very seldom are public utility properties bought and sold on a competitive market. The earnings of public utilities are regulated, and valuation based upon earnings would be begging the

whole question of valuation. 1/

The commercial or market value has, nevertheless, often been proposed as a true measure of the value of a public utility. Such a value has been arrived at in several different ways. The capitalization of earnings has already been dealt with. This, in fact, is one of the "elements of value" outlined in Smyth v. Ames. The courts have not admitted it as evidence of value, however, though they have permitted it to enter rate base calculations in the guise of going value. 2/

Another measure of market value is the market price of outstanding securities. This is found by adding the values of the securities of the public utility as listed on the stock market. Though the selling price of the public utility might justifiably be represented by this value, it does not give us the rate base upon which the public utility is entitled to earn a "fair return", for this market value is dependent upon the rate of return determined or likely to be determined.

Actual sales of property as a criterion of "fair value" has also been urged. But the selling price of a property is essentially determined by earnings, whose determinant again is regulation.

1/ For a thorough treatment of this point in easily understood terms see Rufener, Principles of Economics, (1927), pp. 312 - 316.
2/ Bonbright, op. cit., p. 1117.

The par value of outstanding securities has sometimes been proposed as a measure of "fair value." Though this value is not so directly related to earning power as the previous proposals, it is nevertheless not a valid measure of value as such. Such a measure does not take into account impairment of investment and actual costs incurred. " At best, these face values can only indicate what the assets were worth at the time when the securities were issued. But in practice they have often meant nothing more than an expression of the optimistic hopes or assertions of company promoters." 1/

One concludes that from the economic viewpoint we cannot obtain the value of a utility, nor for that matter of any business property, subject to rate regulation. 2/

1/ Bonbright, op. cit., page 1112.

2/ K.E. Boulding suggests what he calls "probably the ideal valuation method for purposes of rate making ... The amount of capital invested up to the present should be reckoned by taking the compounded sum of all past outlays, whether for 'capital account' or not, less the compounded sum of all past receipts. This valuation ensures that the enterprise has earned 'normal' profits up to the date of regulation. Then profit should be allowed in each year thenceforward at the 'normal' rate." Boulding is aware of the weakness of the method for he continues to say: "Such a method has one flaw which is present in all schemes for the regulation of monopolies. It assumes that the monopoly has a 'right' to earn the normal rate of profit no matter how poorly it is managed or how small the demand for its services ... with a regulated monopoly the rate of profit, however defined, is no check on the efficiency of management." See Boulding, K.E., Economic Analysis, pp. 706 - 707.

The practical objection is that determination of past outlays and receipts would be complicated, if not impossible, especially if records are not available.

We must fall back upon expedients to find a rate base which is "fair", and for that matter, a rate level which meets the requirements of "fair value" and a "fair rate of return." In the final analysis, this involves defining "fairness." The rate base is not the value of a public utility; it is an expression of what the utility shall be permitted to be worth for the purpose of earning a return. What a public utility shall be permitted to be worth has to be considered in the light of some concept of "fairness." Some indications of what is involved in such a concept were made in Part I, in discussing regulatory tests and criteria. Further attention is given this topic in Part III as alternative procedures are considered.

4. Methods of Rate Base Determination

The income or earnings approach to valuation has been shown to be theoretically unsound and fallacious in valuing regulated industries. What has been called the cost approach remains. Here costs are to be determined, but this is a matter subject to much judgment, and also subject to the fluctuations of the price level. Two methods of determining cost, or two cost concepts exist, reproduction cost and original cost. The issue is between a fluctuating and a constant rate base, an

issue which essentially find its origin in the value fluctuations of the monetary unit. A constant rate base is implicit in the original cost or investment method, and a fluctuating rate base in the reproduction or replacement cost method. These methods will accordingly be dealt with.

a. Original Cost

The term of "original cost" is the one most frequently applied to the investment method of valuation. Several other terms are also used; these will be defined presently. Original cost is used in two senses, both substantially being the same concept, namely, the original cost of the properties concerned. Briefly, they are termed unimpaired investment and actual cost.

(i) Unimpaired Investment

Original cost in the sense of unimpaired investment is the amount actually invested in the enterprise from the beginning. 1/ Betterments (or improvements) and additions are included; repairs and replacements are not. Thus the original cost is expressed by the amounts charged to the capital account - the unimpaired investment. The source of investment, whether from the issue of securities or from the plowing back of profits

---

1/ Bigham and Jones, op. cit., pp. 197 - 198.

of the enterprise is not relevant; the amount invested may be made up of both. The determination of unimpaired investment is contingent upon the availability and accuracy of accounting records, and upon the acceptability of the accounting principles that have been applied to these records. Depreciation, repairs, and replacements are, in accordance with sound accounting procedure, charged to operating expenses; additions and betterments are charged to the capital account.

(ii) Actual Cost

Original cost may also be defined as the actual or estimated cost of the property employed for the public convenience. 2/ This cost is determined by taking a physical inventory of the property units, and then ascertaining what these cost when constructed or installed. The cost of each unit is obtained from the records of the company if such are available; if not, such costs are obtained from the use of price data applicable to the period when the units were

---

1/ Depreciation is dealt with later, in detail. Outlays for repairs include such expenses necessary to maintain the tangible property in a state of operating efficiency as do not result in a substantial change of identity, in any particular unit of property. See Bigham and Jones, op. cit., p. 472. Outlays for replacements include exponses necessary to replace one kind of property with another of like capacity. See ibid., p. 473.
2/ Ibid., p. 200.

constructed or installed. A deduction is made for depreciation, and allowance is made for overhead charges that are necessarily incurred in the construction of property though they are not disclosed in the physical inventory. This method of ascertaining original cost must be used where records and accounts are incomplete or unreliable or both. Wherever records and accounts are complete and reliable, the first procedure, unimpaired investment, is more direct, and book cost should show original cost. If, in this case, the second method were carefully applied also, the figure arrived at should correspond very closely with the book cost or unimpaired investment.

In accounting, original cost of a utility property is the cost to the person first devoting it to public service. A plant acquisition adjustment account is set up, expressing the difference between original cost as so defined and the cost to the present owner. This account can then be amortized over a period of years. This provision does not change the amount of the rate base; all that is done is to keep a more detailed classification of

a company's properties. 1/

Several terms are used synonymously with original cost. Actual cost has already been dealt with as a method of stating original cost. Historical cost is taken to mean original cost as above; sometimes it is defined as prudent investment. Generally speaking the three are used interchangeably to mean substantially the same thing. Book cost represents actual cost incurred minus depreciation written off.

(iii) Prudent Investment

A modification of original cost is the prudent investment principle. It is felt that not all investments made by a company are "prudent"; some investments are ill-conceived; further, under an

---

1/ Lasser, J.K., Handbook of Accounting Methods, p.1020. See also Hill, Kay, "The Rate Valuation Issue Reaches Nova Scotia", P.U.Fortnightly, Vol.XXXIII, No.6, March 16, 1944, pp.356-360, and Colbert, Asel R., "Advantages of Original Cost Classification of Plant", ibid., Vol.XXXV, No.6, March 15, 1945, pp.333-349, Part I. Colbert says that the advantage of using the acquisition adjustment account is that the depreciation rate can be based on total service life instead of on a remainder-life basis. This seems a valid claim, and in the long run, this method would provide valuable data for future depreciation estimates of the life-expectancy of various properties.

The above method has been applied in the British Columbia case. Certain properties had been purchased by the B.C.Electric for about $8 million from the Western Canada Power Company to whom the original cost was about $7 million. The commission ruled that the cost to the B.C.Electric be included in its rate base, but that a Utility Plant Adjustment Account of about $1 million be set up. See Currie, A.W., "Rate Control of Public Utilities in British Columbia", Can.Journal of Economic and Polit. Science, Vol.10, No.3, pp.381-390.

original cost method of valuation companies might expand almost recklessly in order to secure a higher rate base. Consequently, it is stipulated that only investments made "reasonably" by a "competent or prudent person" should be included in an original cost valuation. Thus rates would be so adjusted "as to permit a well-managed company to earn a reasonable return on the capital prudently invested in the enterprise." 1/ When original cost is referred to, it is now tacitly assumed that it is subject to the principle of prudent investment; accordingly, references to original cost henceforth in this discussion will be taken to mean actual cost of properties subject to the prudent investment modification.

It may be objected that the prudent investment principle may stifle managerial efficiency and initiative. Betterments and additions may not be made for fear that commissions will rule them imprudent. This is clearly recognized, however, for proponents of original cost emphasize that management shall not be penalized for mistakes in judgment made in accordance with conditions existing at the time of investment. Only when investments can be shown to be unwise, fraudulent, or foolish should the company

1/ Bonbright, op. cit., p. 1084.

making them be penalized; the onus is not upon management to prove that investments are prudent; the onus is upon those who question the wisdom of investments to prove that such investments are imprudent.

The question of prudent investment will arise, for example, in connection with obsolescence. Here it is important that the investment made be examined in the light of technological and economic conditions prevailing at the time of investment. The question is most likely to arise if, even with proper accounting procedures, the company finds itself with obsolescent property for which the costs of construction and installation have not been recovered. In such a case, technological advances have moved more rapidly than anticipated by those making the investment, but the advances may be such as few would have foreseen. The same considerations obtain when unforeseen business condition changes occur.

Standby facilities and equipment installed in anticipation of increased demand will be subject to scrutiny. Outlays for other items of various kinds may be subject to scrutiny also. Cases may arise where equipment has been bought at inflated prices within a holding company organization. Here the price, rather than the decision to invest, is questioned.

b. Reproduction Cost

The reproduction cost method of valuation is also called "replacement cost." This method implies that the returns should rise and fall with the changing replacement costs of the physical plant. 1/ It is "the amount (in dollars) that would have to be expended now (the date of the inquiry) in the construction or acquisition (new) of the properties included in the rate base - a present cost instead of a past cost figure." 2/ The amount is to be found by the appraisals of engineers, and by the use of original cost records to compute present costs of reproducing what was constructed in the past. This process of valuation is necessarily involved and lengthy, and it often becomes a problem to determine what prices to apply - a five or ten year average of past prices, spot or present prices, or probable future prices. 3/

1/ Bonbright, op. cit., p. 1084.
2/ Graham, op. cit., p. 5
3/ The average or "normal price", of course, is not present cost; present prices cannot be applied since the valuation process runs into months and even years; future prices are hypothetical. The pricing problem indicates one of the practical difficulties of applying a theoretically desirable method; ideally, reproduction cost implies valuation changes in agreement with price level movements, but because of the time involved in making such valuations, they may be out of line with the price level by the time they are completed. Valuation procedure is expensive too, sometimes with expenses running up to one per cent of the valuation made. Frequent valuations can thus become significantly costly. Cf. Bonbright, op. cit., pp. 1121 - 1124.

There are two concepts of reproduction cost. The first, and the one in common use, is replacement cost of an identical plant. This involves finding the cost of reproducing the property at present prices. An inventory is taken of the physical property and present prices are applied. Estimated costs of intangible items are then added. The second is replacement cost of service, the cost of setting up a substitute plant giving the most efficient service possible. This would involve a consideration of new location, choice of most efficient equipment, and so forth; the result may be the hypothetical construction of a radically different plant in a new location. Such a plant would conform to the competitive ideal. However, the hypothetical construction of a new plant presents not only practical difficulties; there are difficulties in even a theoretical consideration of the problem. Not only are the costs to be considered price-determined, but the plant itself is a price-determining factor in a system of mutually interdependent prices. The courts have frowned upon this concept of reproduction cost, finding it "too conjectural and leading to collateral issues and investigations having only a remote bearing

on the determination of value." 1/

Whenever the reproduction cost principle has been applied, the identical plant concept has been used. Though the courts have not explicitly stated that the reproduction cost method be the measure of "fair value", their insistence upon finding "present value" has tended to give the impression that reproduction cost is the weightiest element in the eyes of the courts.

Under reproduction cost, depreciation is estimated, usually by engineers, and then deducted from the reproduction cost new. More is to be said of this when depreciation is discussed.

Various intangible items also have to be valued, and here new concepts enter. The idea of going value is but one of these. Also, what is "used and useful" has to be decided. 2/ These questions will be discussed in considering the elements of value.

Several "compromise" methods have been proposed and used in attempts to overcome the defects and difficulties of the two basic valuation methods. These will be considered below.

1/ McCardle v. Indianapolis Water Co., 272 U.S. 400, 417-18 (1926). See Koontz, Government Control of Business, p. 316.
2/ Cf. prudent investment in original cost.

c. The Split Inventory Method

Assuming that the property of a company is to be valued for rate-making purposes, then a specific date is decided upon. All property acquired by the company before this date is valued at depreciated reproduction cost new. Property acquired after the date is valued at actual (original) cost minus depreciation allowances. This method tends to be favored as a compromise by those who advocate the original cost (prudent investment) procedure of valuation. 1/

d. The Index Number Method

Another compromise invokes the aid of index numbers. Original costs are taken; these are then translated into present-cost estimates by applying price-indexes. Usually such index numbers are construction cost indexes. The result is a figure which is supposedly roughly equivalent to the reproduction cost of identical plant. There is considerable disagreement as to what constitutes a proper price index for public utility properties. This method is favored as a compromise by those who advocate reproduction

---

1/ John Bauer is one of these.

cost in rate-making. 1/

e. Mixed Valuations

The structure may be valued at original cost, and the land at market price which is usually taken as the price of adjacent land. 2/ Another method may be to consider many elements and arrive at a compromise value. Thus the value may be worked out on the basis of several methods, the figures obtained being averaged. Another way is to determine both original cost and reproduction cost, and then to split the difference between the two. 3/

1/ W.J. Graham favors this method. Graham seems to be one of the last of a line of economists who favor reproduction cost. From the economic viewpoint, it is desirable that the rate base should, (1) induce investors to continue to invest so that replacements and extensions can be made without at the same time attracting a disproportionate amount of capital from unregulated industry, and (2) permit rate flexibility, so that high rates would prevail during a high price period and vice versa, thus insuring the "proper" balance of prices and costs between regulated and unregulated industry. The reproduction cost advocates point out that these two purposes of the rate base are accomplished by the use of the reproduction cost method. The index number method would presumably be almost equally satisfactory.

2/ Bonbright, op. cit., p. 1090.

3/ Ibid., p. 1091. Bonbright says, "Oddly enough, the precise mid-point between original cost and replacement cost is rarely hit upon - perhaps because such action would expose the choice as a mere compromise between inconsistent standards of rate making rather than a discovery of a supposedly definite 'fact' - the 'fair value' of the property."

5. Depreciation

a. Depreciation in Valuation

Depreciation enters into valuation procedure in an intimate way. No matter what method of valuation is used, allowance for depreciation must be made in arriving at the rate base. The usual procedure is to deduct accrued depreciation from original cost or from reproduction cost new. 1/ This has led to many problems of a controversial nature; "... even among the experts, depreciation is today the most controversial subject in the whole realm of appraisal." 2/ In addition, depreciation is a very prominent risk factor from the point of view of the investors, or for that matter for whoever is going to assume the risks.

Depreciation is a factor in rate-making because it is charged against earnings and because accrued depreciation leads to a reduction of the rate base. Whatever method of dealing with depreciation is chosen, it is based upon assumptions and estimates. This being the case, depreciation is a confusing topic, and a concept which is subject to a rather wide range of

---

1/ Accrued depreciation is the 'total actual loss of value between the date first put into use and the date of valuation of property.' (Marston and Agg, Engineering Valuation, quoted from Lang, Theodore (Editor), Cost Accountant's Handbook, p. 1194.
2/ Bonbright, op. cit., p. 177.

of interpretations. Delos F. Wilcox suggests several causes of such confusion: 1/

" 1. Inherent difficulty in measuring deterioration as it develops.
2. Inherent difficulty in foreseeing and measuring depreciation through obsolescence.
3. The failure to correlate properly the depreciation of a utility plant as a whole with the depreciation of its individual units or elements.
4. The varying standards and practices of maintenance of utility property in use.
5. The varying senses in which the term 'condition' is used as applied to utility property.
6. The failure to tie in the total accrued depreciation as of a given time with the rate of depreciation as it is accruing.
7. The varying policies pursued with respect to the accumulation and use of depreciation or renewal reserves.
8. The disturbing effect of the concept 'fair value' which introduces the element of equity into the problem.
9. The distrubing effect of the concept 'market value' which tends to conceal depreciation under the cloak of good will, going value, and such other intangibles as may inhere in value based upon earning power.
10. The overwhelming temptation of public utility investments to protect and promote themselves by the corruption of the human mind in its so-called expert activities."

The above points indicate both general aspects in depreciation theory, and some aspects more directly concerning public utilities. The basic causes of controversies in depreciation are the difficulties of

---

1/ Wilcox, Delos, F., Depreciation in Public Utilities, Chapter 1.

measuring the physical and technological forces involved, and the disagreements and ambiguities in the concept of what constitutes value of a property. Bonbright says, with respect to the first:

"Even the purely theoretical aspects of the problem require a resort to formulas understood only by higher mathematicians. Indeed, Hatelling states that certain situations call for the development of formulas that await the further progress of pure mathematics itself. In such realms of science the practical appraisers and accountants, like the present author, are lost. Far more serious is the absence of reliable data on the life histories of different types of assets, from which forecasts may be made as to the probable future life experience of the property which is being valued and of the substitute property which serves as a basis of comparison." 1/

With respect to the second he says:

"They (the controversies) are due either to disagreement or to a lack of clarity as to the meaning of 'value' as the thing which is affected by depreciation." 2/

Nevertheless, the question of depreciation has to be faced. In public utility regulation, depreciation is part of the valuation process. The actual scheme of depreciation treatment will depend upon the method of valuation used. It is felt that consistency coupled with flexibility would go far toward solving the problem of equity implicit in public utility valuation. One writer suggests that whatever method of valuation

---

1/ Bonbright, op. cit., p. 178.
2/ Ibid., p. 178.

is used, "depreciation shall be recognized as a reimbursement of cost and treated accordingly." 1/ Accordingly, he outlines the requisites of a satisfactory depreciation scheme:

> "Any depreciation scheme is necessarily based to a large extent on estimates and assumptions. In order that it may operate equitably, the original estimates and assumptions must be reasonable, the scheme must be continuously and consistently carried out from year to year, and proper provision must be made for the correction (without undue disturbance of the operating or financial situation) of estimates made in earlier years which in the light of later experience may prove to have been too high or too low. A further essential is that the theory of distribution of the cost of the property over its useful life shall harmonize with the theory of valuation on which the rate base is to be determined. Finally it is highly desirable, if not essential, that the scheme shall be suitable for the current accounting of the utility, as well as applicable in the determination of rates." 2/

The practicability of applying these principles, and the soundness of the requisites can be judged from a discussion of the causes and concepts of depreciation, and of the methods of its measurement.

b. Causes of Depreciation

Two main distinctions have been made in dealing with the causes of depreciation. They are structural and functional depreciation. Sometimes a third group, contingent depreciation, is added. These distinctions

---

1/ May, George O., "Further Thoughts on Depreciation andd the Rate Base," Quarterly Journal of Economics, Vol. 44, 1929-1930, p. 691.
2/ Ibid., p. 691.

are based upon causal factors, and they are to a large extent arbitrary. They serve as reminders to appraisers of the various elements at work in property deterioration. In attempting to estimate depreciation it is relatively easy to forget some phenomena associated with such depreciation.

Structural depreciation is the result of wear and tear from operation, from the passage of time, and from the elements. Friction, vibration, electrolysis, overheating are some of the forces at work in operation. Oxidation, rot, heat, washing, and freezing are elemental forces at work whether the property is in operation or not. This is what provides the basis for taking depreciation into account in estimating costs of production. "Destruction is the law of nature. Fixed capital ... is not exempt from this law. Even so-called permanent improvements, such as buildings, are all subject to the ravages of time ... All machinery is on an irresistible march to the junk heap, and its progress, while it may be delayed, cannot be prevented by repairs." 1/

Years of experience with different types of equipment make it possible to forecast fairly accurately

---

1/ Hatfield, H.R., Accounting, p. 130.

the service life of a specific type of property so far as structural depreciation is concerned. This means that under ordinary conditions adequate provision can be made to meet the inevitability of replacement. . . . The cost of replacement can be equitably borne by users; that is, the cost can be spread uniformly and thus equitably over the period of years of service. If, in a public utility little, if any, provision for structural depreciation were made in the early years of service life, the users of later years would have . . . to pay higher rates to meet the necessity for replacement. Further, the demand for the service supplied may decrease in later years, and it may become impossible to recover the cost of the original equipment installed.

Functional depreciation results from forces at work in a changing, dynamic society. Such forces are changes in technology and changes in the demand for the service. The former leads to obsolescence, a fall in value of a property due to new inventions or improvements in the design of existing property; the latter may lead to inadequacy, excess capacity, or supersession. 1/

1/ Accountants' Handbook, p. 722. Adapted from Kester's Advanced Accounting.

Inadequacy results from business expansion and the need of larger units. 1/ It has been called the market factor in depreciation. Supersession arises from governmental action. Since public utilities use highways and other public property, the government may require that certain structures of a utility be altered or improved. Overhead wires, for example, may have to be replaced by underground conduits. Excess capacity results from a fall in the demand for the service, or from the cessation of such demand altogether. A property may be quite new and up-to-date, yet its service life is ended with the cessation of the demand if it is peculiarly fitted only to satisfy the demand for the product no longer wanted. There is something to be said for calling the cause of excess capacity obsolescence of the product or service.

The provision for functional depreciation is subject to many uncertainties. Some think it is futile to try to pretend to make precise provisions for such depreciation. Nevertheless, it must be provided for since we live in a dynamic society. Inadequacy can be foreseen under normal conditions and provision made for it; it is, however, an exigency that can arise very

---

1/ Nash, L.R., The Economics of Public Utilities, p. 77.

suddenly in abnormal times such as during a war. Further, businesses generally do not change locations or policies or ownership overnight. Ordinarily, management will have some indications of such changes well in advance, and can act accordingly in providing for depreciation. As to supersession, governments usually give considerable notice of intentions. Law-making is a slow process; popular agitation for change or the advice of experts take time to become effective in the form of legislation.

Obsolescence is generally a very unpredictable factor. It is possible that changes of techniques can be foreseen in many instances because it generally takes years before inventions are improved so much as to replace old techniques.

Some writers go so far as to suggest that depreciation and obsolescence are two distinct concepts. "Depreciation represents productive capacity used; obsolescence represents productive capacity not used." 1/ This would mean that wear and tear is an operating expense, and obsolescence is a loss. It is argued that such a separation would lead to a closer analysis of

---

1/ Accountants' Handbook, p. 730-731, in discussing an article by Moyer in the Accounting Review, Vol. 15.

obsolescence. Moyer says, "At date of purchase, retirement because of obsolescence may appear likely only in the distant future. Later, if developments indicate retirement earlier than originally estimated, an adjustment should be made for the amount of underamortization, and future allowances for obsolescence should be based on the new estimate of life." 1/ Another writer feels that "to reduce so speculative a breakdown of depreciation into monetary entries in the accounts would be to create in the minds of all concerned entirely too much of the impression of infallibility which beautifully balancing figures always produce." 2/ The point arises that each piece of equipment has to be considered with reference to the particular conditions under which it is used. The main concern of the management is to spread the cost of the equipment over the service life of the property. If composite estimates for structural and functional depreciation are made, accounting procedure is simplified, and if estimates are reasonably made, the writing off of significantly large losses at any one time can be avoided. That is, the general feeling is that

---

1/ Accountants' Handbook, p.731

2/ Ibid., p.731, in discussing Taggart's reply to Moyer in Volume 15 of the Accounting Review.

obsolescence, one of the functional aspects of depreciation, can justifiably be treated as a cost comparable to structural depreciation due to wear and tear.

The whole question of functional depreciation is of crucial moment in rate making in public utilities. Obsolescence and excess capacity or cessation of demand are very significant risk factors. On the one hand, accrued depreciation, a composite of structural and functional depreciation, is deducted from the rate base which in turn means a lower return. On the other hand, it is in the interests of investors that adequate provision for depreciation shall be made each fiscal period to keep investment unimpaired. This is especially desirable if it is expected that demand (or supply) conditions will deteriorate.

The legal point of view in regard to depreciation and the rate base is that accrued depreciation should be deducted from present value. 1/ Supreme Court cases also indicate that depreciation should include both the structural and functional elements. Such cases have arisen because some public utilities have argued that

---

1/ The Supreme Court of the United States first made such a ruling in the case of Knoxville v. Knoxville Water Co., 212. U.S. 1 (1909). See Bonbright, op. cit., p. 1127.

obsolescence should not be included, the aim of such arguments being to avoid deductions from the rate base. 1/

To management, functional depreciation presents an economic problem. It may be possible to maintain production more economically by a policy of maintenance and repair which is less costly than the installation of new machinery. Or, it may be more economical to dispense with the property altogether without replacing it. This could happen where demand is falling off or ceases altogether.

Under the heading of contingent depreciation Kester, lists the following: accidents due to negligence, the elements, and structural defects; diseases from parasites, pollution of water, growths in water mains, electrolysis and crystallization; and, diminution of supply as in natural gas and water. 2/ Some of these factors could readily be included under structural depreciation, especially the first two groups. Accidents and damage resulting from the elements are insurable; others are not of such importance that appreciable loss will result. The third group is really a case of depletion, a topic which is given separate treatment.

1/ Bonbright, op. cit., p. 180.
2/ Bonbright, op. cit., p. 187. Bonbright refers to Kester, Advanced Accounting, pp. 222-224, as a reliable accounting authority in this connection.

c. Concepts of Depreciation

Bonbright distinguishes four concepts of depreciation. 1/ Depreciation may mean impaired serviceableness, fall in value, difference in value, and amortized cost.

(i) Impaired Serviceableness

Depreciation may be thought of as the loss of serviceableness. In the narrow sense, it is a purely engineering concept, determinable by inspection and by performance of the property, and expressed as a percentage of service efficiency when new. Thus the question of value is left out altogether, and the monetary unit is not used as a means of expressing depreciation. Broadening the concept, one may take obsolescence into account, and compare the efficiency of a unit of property with that of a newer, and technically superior unit of property providing the same service. This would seem to be the meaning of depreciation in its most fundamental sense, and it seems to be the basis for the definition of depreciation used by two writers. 2/ In applying depreciation

---

1/ Bonbright, op, cit., pp. 183-187.

2/ Bigham and Jones, Principles of Public Utilities, p. 467. "... depreciation may best be regarded as exhaustion of capacity for service, or loss of service life." Whether these writers include obsolescence here does not seem clear. They adopt the definition in order to avoid all associations connected with value, and in consistency with their emphasis upon a cost approach throughout their discussion of valuation.

to rate base determination, however, value considerations arise, and it has been held by many public utility counsel that as long as a machine or unit of property is performing the service expected of it, it is still "just as good as new and should therefore be valued at reproduction cost new." Here it is easy to slip into the error that this means it is "just as valuable as ever." The distinction is one between utility and value. Impaired efficiency is a utility concept, the loss of ability to perform a service. To arrive at the value of the property, one would have to compare the importance of the property in view of its utility with that of other properties performing the same service.

Fall in Value

"The phenomenon of deterioration, which is depreciation in sense number one, may be responsible for a decline in value, which is depreciation in sense number two." 1/ A fall in value may be attributable to the impaired service of the property, and to market conditions such as a fall in demand, or both. Thus the value of an asset may have to be written down because of a decline in serviceability, because of a fall in the demand for

---

1/ Bonbright, op. cit., p. 183.

the service even though the efficiency of the property is unimpaired, or because of both. It is also possible that there may be a rise in value or appreciation if the demand for the service increases.

The accountant does not consider the demand factor in his allowances for depreciation. His prime purpose is to apportion the original cost of the asset over its period of useful life for balance-sheet purposes. He is concerned with cost rather than value. The engineering appraiser attempts to find the present value of the asset. By applying present prices in estimating current reproduction cost appraiser allows for price changes. His deduction for depreciation from this figure would represent the loss in serviceability as compared with a hypothetical, new property.

Difference in value

Depreciation in the third sense may be taken to mean the difference between the present value of the old property and the present value of a hypothetical, new property. Actually, this is a refinement of depreciation in the second sense, for here not only is decline in serviceability considered, but obsolescence due to changes in technique is included in depreciation. Thus, in appraising property, a gross

valuation of the property new based upon present prices is made; then a deduction is made for impaired serviceability. The result would be depreciated value in the second sense. But an alternative property, giving equally efficient service is available for a price lower than the depreciated value obtained above. In the third sense, the price of this alternative property would express the depreciated value.

One can see here that the distinction between physical and functional depreciation becomes artificial. " ... the popular distinction between 'physical' and 'functional' depreciation is a false antithesis. Any depreciation of a physical asset, so far as it need be considered by an appraiser, is at once physical and functional." 1/

Amortized Cost

Depreciation from the accounting point of view is

1/ Bonbright, op. cit., p. 185. He continues, "Consider two dynamos, the one of which is depreciated because its commutator has worn out and its insulation has become defective, whereas the other is depreciated because a more efficiently designed substitute is now on the market. Ordinarily the former depreciation would be called 'physical' or 'structural', whereas the latter would be called 'functional'. Clearly, however, the obsolescence is no less physical than the wear and tear; for a difference in design is certainly physical or structural in nature. Moreover, the wear and tear has a functional significance; otherwise it would be of no concern to an appraiser."

usually called amortized cost. It is a cost concept rather than a value concept. Depreciation here becomes the "part of the cost of an old asset which should have been written off from the capital account and charged to income account or to some special reserve". 1/ The amortized cost does not necessarily equal the fall in value of the asset; in fact it will rarely, if ever do so. The purpose of a depreciation account is not to enable the business to find present value; rather, it is to transfer the cost of a fixed asset from capital account to income account or a reserve over the period of expected useful life. The methods used in computing annual charges for depreciation are based upon life-experience tables of different properties, and an attempt is made to approximate the annual fall in value. Price changes are not allowed for in accounting. "Accounting is usually carried on under the assumption that the value of the dollar remains unchanged". 2/ Thus the book depreciation will be greater or smaller than the appraised depreciation in accordance with price changes. Accounting authorities recognize this point, but a practical alternative

---

1/ Bonbright, op.cit.,p.186
2/ Boulding, K.E., Economic Analysis, p. 707.

procedure is yet to be found. 1/

d. The Measurement of Depreciation

Even if there is agreement that depreciation properly conceived is the result of wear, tear, age, obsolescence, inadequacy, and excess capacity, a host of new problems assert themselves. The causal forces are not capable of precise measurement because, although objective elements are significant, subjective elements, involving judgment, are present. Life-expectancy tables are available for various types of equipment which enable appraisers and accountants to estimate the effects of wear, tear, and age. 2/ These are not entirely reliable, however, for it has been found that the same type of equipment may last longer when used by one concern than when used by another concern. 3/ Also, such life-expectancy data can lead one to assume that an asset with a probable useful life of 30 years and now 10 years old has therefore a most probable remaining useful life of 20 years. This is subject to the same error that one would make in assuming that a man of 40 has a probable future life

---

1/ For a brief exposition of the relationship between accounting procedures and business fluctuations, see Boulding, op. cit., pp. 707-708.
2/ I. e. structural depreciation
3/ Bonbright, op. cit., p. 200.

of 10 years less than that of a man 30 years old. 1/

Granted that structural depreciation could be objectively and accurately measured, one is still faced with finding yardsticks with which to measure functional depreciation. Here past experience is of little avail in predicting the future; any projection into the future is necessarily predicated upon judgment, "hunches", and guesses. Finally, the question of apportioning depreciation over a period of time presents both theoretical and practical difficulties.

e. Depreciation Measurement as a Deduction from Cost New

Assume that a property has to be valued, and that the basis of valuation is replacement cost. This would mean depreciation in the third sense of the concepts discussed previously. The appraiser's problem then becomes one of finding the difference in value between the existing property and a hypothetical new property. This may be done by estimating the difference in income between the two properties, capitalizing this with reference to time and life-expectancy of the two. The present value of the hypothetical new property being given, the present value of the existing property

---

1/ Bonbright, op. cit., p. 200. Also many tables fail to point out which is meant, the mean expectancy, or the modal expectancy; that is, life expectancy in the insurance sense or the most probable future life.

is found by deducting the differential capitalized income from the former value. It will be seen from this that depreciation measurement is a method of property valuation by means of income capitalization. 1/ In other words, property valuation cannot be separated from the question of depreciation; a statement which seems axiomatic, but one which justifies the attention that depreciation deserves in valuation cases.

In practice, it is not possible to arrive at the precise differential income capitalization of two assets, any more than one can estimate precisely the income of a corporation of a fairly stable character say three years hence. Formulae have been developed to supplement the judgment 2/ of the appraiser. The mathematics involved in developing these formulae is complex, and no attempt is made here to deal with them except in the most elementary way, and only the most fundamental formulae receive consideration. Essentially the formulae treat depreciation as a function of time or output or both, and they yield straight lines or curves when plotted.

1/ Bonbright, op. cit., p. 190.
2/ Bonbright calls it "guess work", op. cit., p. 191.

Before considering some of these formulae, two or three points need attention. One is the question of retirement dates; another is salvage value; a third, briefly dealt with already, is future service life estimates. Retirement date means "the date as of which the asset comes to the end of its useful life for the purpose for which it was designed, and when its value has therefore become identical with its net salvage or scrap value." 1/ This date usually comes before the asset ceases to function - it comes when it becomes more economical to replace the old with the new. It is in this sense in which it is used here.

Salvage value is "the price at which the owner can dispose of the asset after its useful service life, for his purposes, has expired." 2/ The asset may be sold to somebody who will continue to use it in the capacity for which it was originally intended, or it may be sold for

---

1/ Bonbright, op. cit., p. 199. This is the sense in which retirement date is pertinent to an appraiser of estimated prospective useful life. Bonbright defines retirement date in the accounting sense, and in the actual sense also. The former is a purely arbitrary date, being the date on which the asset is written down to salvage value; the latter refers to the date on which the owner disposed of or abandoned the asset. Neither is acceptable for appraisal purposes. The first may result in either deficient or excessive write-off; the second may lead to the owner's intentionally keeping a useless asset if he thinks he can get it included in a valuation, as for example, in the rate base of a public utility.

2/ Ibid., p. 201.

scrap. Sometimes the salvage value is negative since the cost of getting rid of the asset has to be deducted. The tearing up of the rails of a street railway for the purpose of paving for electrobuses is a case in point. 1/

The estimation of depreciation by differential income capitalization is subject to various considerations. A simple case would be that of an existing and a hypothetical new property with equal and constant annual incomes, differing only in length of service life, the new property having the longer life. The existing property would be valued according to the proportion its capitalized income is of the capitalized income of the new property, subject to the application of mathematical formulae. Another simple situation would assume the two properties as having equal future service lives but a constant difference in annual income. A combination of the two cases is also possible; that is, the existing asset has a shorter life and yields a smaller income than the hypothetical, new asset. These cases are relatively simple; actually, the income yielded by the two assets will vary with time; the differential of the two incomes will also vary with time. These observations are made here to

---

1/ Bonbright mentions a tumbledown house on a lot as an example. See op. cit., p. 202. The house has to be torn down before a new building can be erected.

show the mathematical and practical difficulties involved in measuring depreciation by capitalizing future income.

The actual methods used to compute depreciation and to determine value at any given time now need consideration.

The data required for the computation of depreciation are the original cost of the asset, its probable life, and its salvage value. The accuracy of the computation depends upon the accuracy of the life-expectancy estimates available. The greater the experience forming the basis of such service life estimates, the greater the accuracy is likely to be; however, the forces of functional depreciation are unstable elements which can render estimates highly inaccurate.

The person who is most frequently called upon to deal with depreciation is the accountant, and the methods he employs in measuring and apportioning depreciation are here considered. Engineers furnish life-expectancy data, and may also be called upon to make appraisals by observation. Accordingly, what is called the observation method is also considered.

f. The Straight Line Method 1/

When the straight line method is used it is assumed that the asset will depreciate at a constant rate during its service life, and a constant fraction or percentage of the original cost is written off each fiscal period until the asset is reduced to salvage value minus removal costs. If C is the original cost, S the salvage value minus removal costs, and T the length of time between acquirement and disposal of the asset, then V_t, the value t years after acquirement is given by the formula:

$$V_t = C - \frac{(C - S)t}{T} = \frac{C(T - t) + St}{T}$$

If we suppose that C is \$1000, S is \$200, and T is 4 years, the formula becomes $V_t = \frac{1000\ (4 - t) + 200t}{4}$ which equals $1000 - 200t$. A table showing the values of V_t is as follows:

t =	0	1	2	3	4
V_t =	1000	800	600	400	200

The main criticism of this method is that the time discount factor is not considered, and that for this reason depreciation tends to be exaggerated at

---

1/ I am indebted to Boulding, K.E., Economic Analysis, pp. 714-718, for mathematical formulae used. The hypothetical data used are mine.

any given time. It may also be exaggerated because the service life remaining, as computed from life-expectancy tables, may be shorter than the actual service life remaining. That is, an asset may have a probable life as estimated by the use of tables of ten years. After five years, five years of service remain according to the tables. This is like assuming that if a man of twenty has a life expectancy of forty years, then, at the age of forty, his life expectancy is twenty years, a point not borne out by tables used by insurance companies. This shows an inherent defect in the use of tables rather than a defect in the straight line method, for this criticism is also valid where the sinking fund or any other method based upon formula is used. The way to overcome this defect would seem to be the constant revision of life expectancies at the end of each accounting period; that is, put accounting on an actuarial basis, a process, however, which would involve many accounting and administrative complexities.

Bonbright disagrees with the usually accepted assumption that the straight line method exaggerates depreciation. 1/ He says that an asset performs more

---

1/ Bonbright, op. cit., p. 204.

service and loses more efficiency during the first half of its life than during the second half; that is, the rental value or services performed taper off with age. This offsets the exaggeration resulting from the omission of the time-discount factor and the use of life expectancy tables on a non-actuarial basis. Indeed, he goes so far as to hazard an opinion that in the case of assets of very long life, the straight line method understates depreciation. 1/

Finally, it may be noted that the use of the straight line method necessarily implies the assumptions that depreciation varies only with time, and that the asset is used continuously or regularly throughout its life. These assumptions are implicit in the other methods dealt with here also. The straight line method is used very extensively for writing off buildings, machinery, patents, and similar items. 2/

g. The Sinking Fund Method

When the sinking fund method is used, a constant amount is set aside each year of service life. This

---

1/ Bonbright, op. cit., p. 204.
2/ For a mathematical analysis of what system of inputs and outputs will make the straight line method "correct", as judged by exponential allocation of the differential between input and output, see Boulding, K.E., Economic Analysis, Chapter 31, pp. 710, 714, 717 - 718.

amount must be sufficient to provide a sum equal to the cost of the asset when these annual amounts are invested so as to yield a given rate of interest compounded each period. The formula is usually called the "annuity" formula. The principle is seen to be the same as the one applied in the straight line method, but with compound interest included.

C, S, T, and t of the straight line formula may be used again. In addition, let a be the amount set aside each year, and i the rate of interest. The amount a may be found from the equation:

$$a(1+i)^{T-1} + a(1+i)^{T-2} + \ldots + a(1+i) + a = C - S$$

or

$$\frac{a}{i}\left[(1+i)^{T} - 1\right] = C - S$$

By the end of the year t, the amount of depreciation provision (D_t) is the compounded sum of all the previous a's:

$$D_t = a(1+i)^{t-1} + a(1+i)^{t-2} + \ldots + a(1+i) + a$$

$$= \frac{a}{i}\left((1+i)^{t} - 1\right)$$

$$= \frac{(1+i)^{t} - 1}{(1+i)^{T} - 1}(C - S)$$

Hence:

$$V_t = C - D_t$$

$$= \frac{C\left((1+i)^T - (1+i)^t\right) + S\left((1+i)^t - 1\right)}{(1+i)^T - 1}$$

Assuming previous figures, and that i - 5%, the formula becomes:

$$V_t = \frac{1000\left((1.05)^4 - (1.05)^t\right) + 200\left((1.05)^t - 1\right)}{(1.05)^4 - 1}$$

$$= \frac{1000\,(1.05)^4 - 800\,(1.05)^t - 200}{(1.05)^4 - 1}$$

A table of values (to the nearest dollar) would be as follows:

t =	0	1	2	3	4
V_t =	1000	815	620	415	200

It will be seen that accruals increase each year because of the effect of compound interest. The value falls more rapidly as time goes on, or $\frac{d^2V}{dt^2}$ is a decreasing function.

This method is subject to the criticism noted before in connection with the straight line; namely, that serviceability decreases more sharply during the first half of the life of an asset than during the second half. If one agrees that this is so, then the sinking fund

method would overstate value more than the straight line method. If a curve were plotted showing serviceability as a function of time, a concave one would depict serviceability as decreasing more sharply at first; a convex one would depict serviceability as decreasing more sharply during the second half of the life of the asset. The sinking fund curve is convex, and thus the sinking fund method would be appropriate in the second case.

h. The Reducing Balance Method

The reducing balance method is sometimes used in dealing with factory plant and equipment, but is not extensively used because the calculation of the percentage factor used is not widely understood. The value is written off each year by a fixed percentage of itself until it is coincident with scrap value on the retirement date. Such value is expressed by the exponential formula. If K is the fixed proportion or percentage remaining each year, 1/ and previous notation is used, $V_1 = KC$, $V_2 = KV_1 = K^2C$, and $S = V_T = K^TC$
Then, $V_t = K^tC = \left(\frac{S}{C}\right)^{\frac{t}{T}} C$,

---

1/ Thus, if 30% is written off each year, K = 70%.

$$\text{or, } \log V_t = \frac{t}{T}(\log S - \log C) + \log C$$

$$= \frac{t \log S - t \log C}{T} + \log C$$

$$= \frac{t \log S - t \log C + T \log C}{T}$$

$$= \frac{(T - t) \log C + t \log S}{T} \quad 1/$$

A table, assuming hypothetical values used previously would be as follows to the nearest dollar:

$t =$	0	1	2	3	4
$V_t =$	1000	669	447	299	200

This method would seem to arrive at values more in correspondence with remaining service life, the depreciation charge decreasing each year. Here $\frac{d^2V}{dt^2}$ is an increasing function, which is also the case for service life as a function of time. 2/

A comparison of the three methods may be effected by means of a graph. V_t is plotted against t in each case.

1/ A formula for computing the percentage written off is $r = 100\left(1 - \sqrt[T]{\frac{s}{C}}\right)$, where T is the service life, s the salvage value, C the original cost, and r the required percentage. See Smails and Walker, Accounting Principles and Practice, p. 127.

2/ This statement is subject to modifications. The service life function may not behave in this way; much depends upon the type of asset. The service life of an automobile, for example, is not a continuously descending function of use; during the first part of its life its efficiency rises; later it falls. This phenomenon is common to many assets, and one can see why there is no single formula that can be applied to all assets.

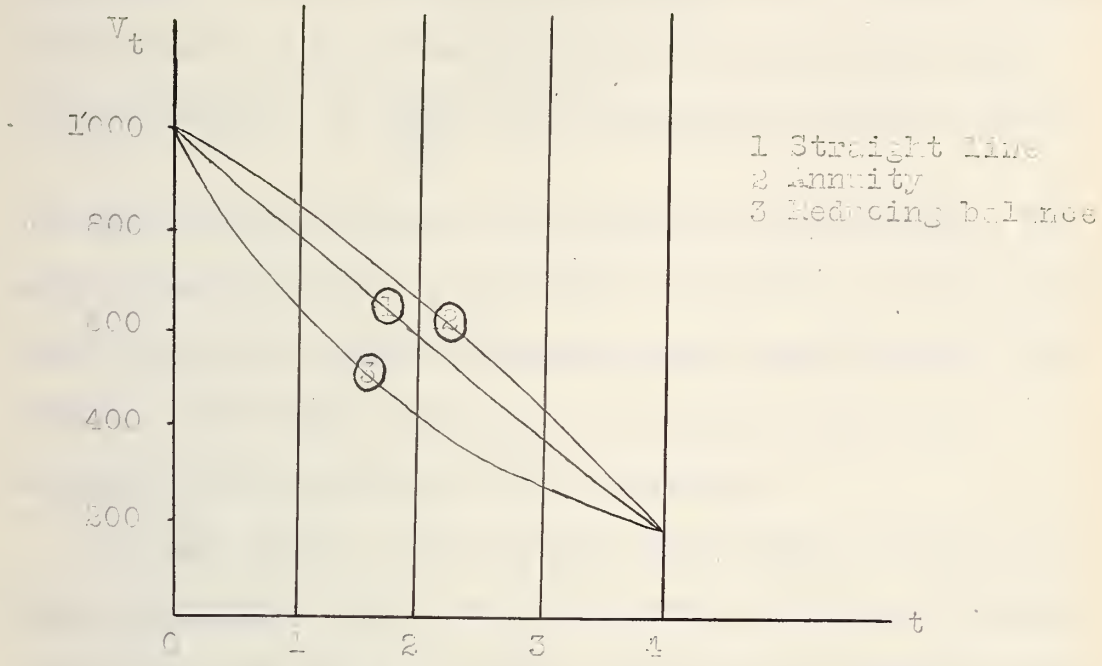

Fig. 1

Now, assume that serviceability be represented by E, and that it can be plotted as a function of time. One needs to note also that the greater i is in the annuity formula, the greater the convexity of the curve. The concavity of the exponential function depends upon the time. Some conclusions may now be stated.

$\frac{dV}{dt}$ is negative in all cases, but in (1) in Fig. 1 $\frac{d^2V}{dt^2}$ is constant; in (2), $\frac{d^2V}{dt^2}$ is decreasing; in (3), $\frac{d^2V}{dt^2}$ is increasing. Now, if we assume hypothetical curves depicting E as a function of t, we may note that if $\frac{d^2E}{dt^2}$ is decreasing, an assumption that is seriously

questioned in the case of many assets, the annuity formula would seem to apportion and measure depreciation most appropriately. If $\frac{d^2E}{dt^2}$ is an increasing function, then the exponential method would seem most appropriate. If one is dealing with an aggregate of assets, it seems that there would be offsets both ways, and the straight line formula would seem reasonable for apportioning and measuring depreciation in the aggregate.

In any event, the straight line method is the one most frequently used. From the above analysis it might seem that this method is more likely to be closer to the mark if assets are taken in the aggregate than either of the others. In the case of individual assets, the rate of impairment of efficiency would have to be considered if one is to apply an accurate depreciation formula. It should be noted too that many other formula are available. These will not be discussed here. One wonders if it is worth-while to try to apply such formulae for each type of asset in view of the complexity of administration and accounting involved in such procedures. The tendency of appraisers and accountants is to use a single formula for the sake of simplicity, a practice further justified by the lack of data required to apply various

formulae for different types of assets. Also, there is a feeling that a single formula serves as a sort of statistical average by which errors one way are compensated by countervailing errors. This has been indicated above in regard to the straight line formula, the one most frequently used.

However, at least one writer questions the scientific validity of such expedients, and he says:

"Finally, a word is needed concerning the often asserted automatic compensations of error in the use of certain methods. It is said that while a given formula may find an erroneous depreciation in a given service-life - year of an asset that there may be many assets of like kind in all the stages of service-life from brand new to approximate scrapping time. It is said that the length of life of some will be overestimated and the service life of others will be underestimated. It is said that mixed types of assets will be found in any enterprise. Granted that compensations of these kinds and of others do exist, their existence does not theoretically justify the use of crude statistical methods unless it can be shown that the whole set of compensations makes it a matter of indifference whether one method or another is used.

Such a set of compensations is conceivable, but no study has ever been made on a scale big enough to prove its existence in fact in any industry. There are, however, the firmest of a priori grounds for doubting the existence of such a state of affairs. So long as new enterprises, or for that matter, old ones, build and equip in anticipation of an increased volume of business, so long as enterprises continue to be short-lived, so long as enterprises are subject to changing physical volumes of business and to shifts from one line of products to another, just so long will there be preponderances of one type of asset or another. Just so long, too, will the so-called simple methods continue to grind out valuations and costs that are invariant to the conditions upon which ultimate profit and loss depend". 1/

1/ Canning, John B., The Economics of Accountancy, pp. 341-342. Canning discusses the whole question of formulae and their application in Chapters 13 and 14.

i. The Observation Method

The attitude of the courts toward theoretical formulae for calculating depreciation has not been favorable in public utility rate cases. This is understandable since the law in general demands that facts in the case be given as evidence. The difficulty here, however, is that these "facts" become no more than the results of the judgments of appraisers. If value could be ascertained as a fact, the whole question of valuation and the complementary ascertainment of depreciation would be simple indeed. Yet the implication of the observation method is that value and depreciation can be determined reliably by inspection. At best, and this is recognized by the courts and all concerned, the observation method serves as a check on other methods.

Usually the observation method is resorted to when there is disagreement among the parties concerned as to the reliability of accrued depreciation as a measure of actual or realized depreciation. The formulae and methods applied in accrual policy may be questioned. Further, there is a psychological factor present; actual observation has an intrinsic reliability to the human mind which it is particularly difficult

to dispel if the observation is made by an expert. Appraisal by observation is an engineering problem, and in fairness to the engineer one must state that he is not too happy about having the problem on his hands, for he knows too well that there are many factors operating in property deterioration with which he cannot deal.

The first specific defect of the method is that many types deterioration are not discernible to the eye. Some assets cannot be inspected at all, for example, underground pipes. Others may be seen, but the inherent nature of their functions render an estimate of deterioration impossible. A case in point is that of electric light bulbs. As a consequence, observation will tend to serious understatement of depreciation.

A second defect is that the appraiser has no way of knowing how long an asset will continue to give service, unless he falls back upon life-expectancy tables and formulae, the very things which the observation method tries to supplant. In the end, one has to admit that observation is, if anything, less reliable than the use of methods based upon experience and formulae.

The observation method is popular, however, among parties whose property is to be valued for condemnation,

for rate-making purposes, and so on. They prefer it because it tends to understate depreciation, thus yielding a higher valuation. The courts prefer it as a method yielding evidence of "fact". For these reasons, the observation method continues to be used, although it is an expensive, elaborate, and time-consuming procedure.

Bonbright is convinced that courts, commissions, and juries make too small allowances for depreciation in valuation cases. 1/ This is attributable to the difficulty of proving to all and sundry that the depreciation is greater than that which can be observed by anyone. But it is also attributable to "that psychology of private property which is expressed by the concept of a 'vested interest' ... one might almost define a vested interest as a prescriptive right to have old property valued as if it were new." 2/ In other words, people naturally resist any procedure which may injure their present income and status.

j. Composite Depreciation 3/

So far, we have essentially considered depreciation

1/ Bonbright, op. cit., p. 215.
2/ Ibid., p. 215.
3/ Ibid., pp.206-212

as applicable to single units. In cases, such as public utility valuations, a whole plant has to be evaluated, and consequently the problem of composite depreciation arises.

The public-utility companies and the railroads have advanced the plant immortality theory to support their claim for a valuation of replacement cost new with practically no deduction for depreciation. This claim is based upon a retirement policy of depreciation whereby assets are written off to expense as they are replaced, no depreciation reserve being used. The contention is that a well-maintained plant consisting of many assets of relatively small individual values and of many different ages, is just as valuable as a new plant. Outlays for replacement become stabilized and become part and parcel of ordinary expenses.

The chief criticism one can advance here is that a new plant would have practically no replacement charges, while as the plant approaches maturity the greater such replacement charges must be. Further, the factor of obsolescence is ignored, and it becomes evident that it becomes an invalid measure of reproduction cost. Probably a better case could be made for it from the point of view of actual costs. 1/

1/ Bonbright, op. cit., pp. 207-208, and pp. 1127-1129.

Another theory applied to composite plant valuation is the 50 per cent theory. Here again a wide variety and number of assets is assumed, and on the basis of the law of averages and the statistical philosophy implied in the straight-line method, the average life of the plant is taken as being half of the cost new. Essentially the same result should be reached by appraising the separate assets by the straight-line method. Hence it is not a true composite depreciation theory. 1/

A third theory advanced is the organic theory which holds that the depreciation of the whole plant is a larger percentage than the percentage depreciation of a single asset. Thus the depreciation as a whole is greater than the sum total of the depreciation of the parts. The whole theory is closely associated with the most efficient substitute plant concept of reproduction cost.

If we suppose an obsolescent plant, it is evident that the depreciation for the whole plant is great. But if you consider any individual item in that plant, it becomes evident that the depreciation of individual parts is not so great with reference to reproduction

---

1/ Bonbright, op.cit., p.209

cost new. It is likely that because of the general obsolescence of the plant, the newest and most efficient equipment cannot be installed as a unit among the obsolescent units in the plant. An example would be an electric power plant generating direct current. Only direct current equipment can be installed, even though alternating current equipment is more efficient. But the latter cannot be used so the former has to be bought. Consequently, the parts would be depreciated less than the whole.

The question of valuing the whole plant, however, is fraught with all the difficulties of valuation. The concept of a most efficient substitute plant is extremely hypothetical, and if anything, is more conjectural to deal with than the concept of reproduction cost of an identical plant.

k. Appreciation

"Hundreds of pages have been written about depreciation for every page that has been written about appreciation." 1/ Here appreciation will be given passing mention in keeping with the quotation. Some assets actually appreciate in value with age and use. Aged

---

1/ Bonbright, op. cit., p. 212.

liquors are worth more than raw liquors; antique furniture is worth more than new furniture; railway road beds "solidify" with use and maintenance; broken-in automobiles are more efficient than completely new ones.

Actually, where an appraiser has to deal with an asset which has appreciated, he unconsciously allows for it when he can appraise it according to market value. But where fixed assets of an enterprise are concerned there may be no guiding market value, and therefore, in the end, the appraiser is forced to rely upon his judgment. This may be expressed in terms of a lower allowance for depreciation for the whole plant.

The question of appreciation is rather insignificant in public utility valuation, but it has received much attention in connection with railroad valuation where the railroads have claimed an allowance for roadbed solidification. The courts have not been inclined to grant such an allowance. 1/

1. Accounting Procedure

Accounting for depreciation involves the making of estimates and of charging the resulting amounts to the proper accounts. In the case of a public utility under regulation it is important that estimates for depreciation

---

1/ Bonbright, op. cit., p. 213.

are based upon the most reliable experience and data available, and that the system of accounting be uniform. Lack of reliability and uniformity can lead to impairment of investment with serious consequences to the investors, and/or to the overcharging of consumers; they can lead to inequities in the realization of the expectations of the various classes of investors and consumers.

The fundamental problem of depreciation as a consideration inseparable from valuation has been dealt with. Primarily we are concerned with fixed assets, or those assets which have a service life exceeding the accounting period. Certain assets are used up during the period and are charged to operating expenses, while others, like land, are never used up and are therefore not subject to depreciation allowances.

Assuming that the accounting system is based upon the best estimates available, that both structural and functional depreciation are allowed for in such estimates, the approved procedure is to charge the estimated annual depreciation to the capital account, and the corresponding credit is made to a reserve account. The allowance is added to operation expenses, and recovered out of rates to consumers. The reserve may be held as cash; it may be invested in securities of other companies; or,

it may be reinvested in the company, that is, replacements will be made.

In any event, the investment remains unimpaired. 1/ The first two methods will mean a reduction in the rate base of a public utility; the third will maintain it at the same level if replacements are made at the same rate as depreciation allowances are made.

Additions and betterments 2/, unlike repairs and replacements, are harged to capital account. It needs to be pointed out that a replacement is met by the depreciation allowance, and the valuation of the property

---

1/ There are risks, of course. This risk is smallest if cash is held, but under this procedure only bank interest would be earned on the cash deposited in the bank. A higher rate of interest would be earned on investments outside the business, depending upon the degree of risk. It is generally conceded that such investments should be of the "safe" kind, viz., bonds and possibly preferred stock. It is also felt that reinvestment in the business yields the highest return, and this is the most common procedure. In this way the efficiency of the plant may be maintained.

2/ Additions are "land, structures, facilities, and equipment, with a life expectancy of more than one year, which do not take the place of like property previously held by the company." Betterments are "mechanical changes in structures, facilities, and equipment, the object of which is to make the properties affected more useful or greater capacity than they were at the time of their installation or acquisition." See Bigham and Jones, Principles of Public Utilities, p. 475.

remains the same. Since the depreciation allowance is included in operating expenses, replacement is properly charged to operating expense. The same thing holds true for repairs. But a betterment will involve the renewal of an asset by means of a more efficient asset costing more than mere replacement with an asset of equal efficiency. The excess in efficiency represents a betterment and any excess in cost is chargeable to capital account as an increase in investment. The additional amount is met by a reinvestment of distributable earnings, 1/ or by floating more stock. Additions similarly warrant the same treatment. 2/

A difficulty that arises is that of determining the cost of replacements, additions, and betterments. If the installation and construction are made by external agents this difficulty is not so great, but if they are the work of the company's personnel, the distribution of overhead costs becomes a major consideration. It becomes a matter of determining how much of the cost is attributable to operating expense and how

---

1/ Earnings which could be distributed as dividends to stockholders.

2/ For a detailed explanation of the accounting procedure itself see, any good accounting text, for example, The Accountants' Handbook, or Paton, W.A., Advanced Accounting. Bigham and Jones also give some more elementary illustrations on pp. 468 - 478.

much to the asset account and hence credited to capital account. If too much is charged the asset account, a permanent and unjustified addition is made to the rate base, with the result that rates to consumers are proportionately increased. If too much is charged to operating expense, the rate base will be understated and consumers' rates will accordingly be lower, except that the addition to operating expense must be met in the year of installation. 1/ The apportionment of the cost becomes a problem of the cost accountant, who, it is assumed, will apply approved techniques to it.

If the accounts of a public utility have been properly kept, the book value will provide a guide for fixing the rate base. The rate base will be determined by deducting accrued depreciation from the actual cost if the original cost basis is used. This would seem to be the case also if reproduction cost new is taken. The question here is whether the depreciation reserve representing accrued depreciation corresponds to actual or realized depreciation. No matter how skilfully original estimates were made, the future cannot be accurately forecast and some adjustments may be needed.

1/ The above discussion is subject to the proviso that the rate base is determined on an original cost basis. However, book values do influence reproduction cost valuations for rate bases never seem to be set below the original cost, no matter what the valuation basis is.

This may be done by accounting adjustments made directly by new estimates and the setting up of appropriate reserves, or the inspection (observation) method may be resorted to.

It was previously indicated that the courts favor the inspection method, and some of them have ruled that depreciation reserves are merely accounting records, not necessarily relevant in arriving at a proper deduction from a rate base. 1/ The danger in accepting the accounting, estimate for annual depreciation, and the observation estimate, which is chronically lower, where standard accounting procedures have been followed, for accrued depreciation for rate base determination, is that the consumer will have to pay higher rates. First, he will pay rates that cover the annual depreciation charge, and second, he will continue to pay rates based upon a rate base which has not been reduced according to the accounting estimate. It is even conceivable that in this way consumers have to pay twice for the same

---

1/ In Pacific Gas and Electric Company v. San Francisco, 1924, the Supreme Court said that "facts shown by reliable evidence were preferable to averages based upon amuned probabilities", and in the Indianapolis Water Company case of 1926, it stated that "the testimony of competent valuation engineers who examined the property and made estimates in respect of its condition is to be preferred to mere calculations based on averages and assumed probabilities." See Bigham and Jones, op. cit., p. 477.

property. It is one of those problems of valuation procedure that would be more equitably dealt with as regards both consumers and investors if consistent principles of regulation were applied. There is always the danger that inadequate provision is made for depreciation, especially in regard to obsolescence. This will mean that consumers have enjoyed lower rates than warranted, and if the utility is to avoid loss, it must be permitted to keep its rate base intact, and present and future consumers will have to pay higher rates. Even if ample consideration has been given obsolescence in making depreciation allowances, the rate of technological change may be more rapid than anticipated and the same situation may be faced. It is these factors of obsolescence, inadequacy, and excess capacity which render the risk element so significant that those who regulate must make provision for it in setting the rate of return, and they have to consider what proportion of such risks shall be carried by consumers and investors.

m. Depletion and Depreciating Assets

Depletion is "the physical impairment of an asset

by the deliberate extraction of its physical content." 1/ It refers to wasting assets, such as minerals and timber, and is distinct from depreciation. The question of depletion is relevant in a public utility supplying natural gas. One searches in vain in the literature available, however, for a complete discussion of the question.

One problem arises in connection with depreciation of plant assets used to exploit a wasting asset. It becomes a question of apportioning depreciation over the life of the wasting asset. Where the plant and equipment are expected to last a shorter time than the wasting asset, depreciation allowances can be made in the ordinary way of estimating service life from wear, tear, and obsolescence. A different consideration arises where the plant and equipment are expected to outlast the wasting asset. Accounting authorities seem to be agreed that in such a case the service life of the depreciable assets is no longer than the life of the wasting asset. Further, the depreciation would be calculated in terms of the rate of output. 2/

1/ Smails and Walker, Accounting Principles and Practice, p. 133. For a more detailed discussion of depletion see Accountant's Handbook, pp. 628 - 629.
2/ Paton, Accountant's Handbook, p. 640.

The problem has become of significance in at least one case of regulation in Alberta, 1/ and has been dealt with in the brief presented by the consulting economist of the Public Utility Commission of the province. 2/ It is proposed to examine briefly the position taken by him here. He posits the conditions that a company invests $1,000,000 in plant to be used to extract a raw material, that the company has made the best estimate possible of the quantity of raw material available, and that on this evidence the plant is going to outlast the raw material. It is pointed out that the company would not invest unless it felt it could recover costs at least, and that the proper method of accounting for depreciation is to transfer to income account or reserve depreciation at the rate of output of the raw material, quite in keeping with accepted accounting procedure.

It is now assumed that the company becomes subject to regulation, and that its accounting for depreciation, for various reasons has not been in line with the

---

1/ An inquiry into the production, processing, and the sale by wholesale of natural gas from the Turner Valley field undertaken by the Public Utilities Commission of Alberta, an inquiry which is still going on.
2/ Stewart, A., Alternative Methods of Public Utility Valuation for Purposes of Rate Control, Exhibit 131 in the inquiry above, pp. 7-8.

principle laid down above. The company's books then will not show the proper amount of depreciation. It is further assumed that estimates of the life of the supply of the raw materials have been revised in the light of present and superior knowledge. The solution proposed is that accrued depreciation be calculated with reference to the amount of raw material extracted and the new estimate of the supply available. The investors took the risk after estimates were made before the initial investment, and if new estimates become available, they should, in consistency, continue to take the risk; if the new estimated life of the field is longer than the former estimate, they gain; if not, they lose. In any event, it is difficult to see how the plant could be valued on a reproduction cost new principle for rate base making purposes when, say only two or three years of operation is in sight in a field which has been in operation, using the plant in question, for ten, twenty, or more years. Yet this would seem to be the conclusion to which any other principle of dealing with depreciation than that proposed, would lead us.

Another problem in this connection, is the case of a company under regulation which has written off all its plant to depreciation as it has come to the

estimated end of the field. Now, despite the estimate, there are still raw materials available in the field. The company has no rate base here, yet its plant is still functioning and more raw materials can be extracted. In such a case steps would have to be taken to induce the company to continue operation if this is deemed to be in the "public interest." If we are to be consistent with the principle involved in having the investors accept the risk, we cannot force them to continue to operate if they do not wish to. It seems that some device would have to be worked out to provide an incentive, such as a certain return over and above operating expenses.

The questions dealt with here indicate some of the more specific problems that arise in connection with public utility valuation and depreciation, and it is not proposed to deal with solutions in a general thesis. They are instances of the kind and number of problems that can arise.

n. Conclusions

Valuation involves one in a consideration of depreciation, and depreciation involves valuation. Some aspects of valuation have therefore been dealt with,

and need not receive more attention.

Depreciation is peculiar to fixed assets. The valuation problem presents the greatest difficulty in connection with fixed assets, especially where these cannot be disposed of on a competitive market, and it becomes particularly acute in the case of specialized fixed assets or those which lack any appreciable degree of mobility such as those found in public utilities. Items which enter into current expenses are not part of the depreciation problem; they are usually bought and sold under conditions of alternative opportunity; they are not subject to valuation for rate base determination.

The determination of depreciation and valuation are complementary processes. Indeed, it could be said with much justification that depreciation determination and valuation are one and the same problem.

6. The Elements of Value

The elements of value refer to the things to be valued. In public utilities three main groups are discernible: physical property, working capital, and intangible property. The law has defined the elements of value as those properties which are "used and useful" in the public service. However, the commissions have

applied the "used and useful" principle only to physical property in computing rate bases, and have then added separate allowances for the intangible items.

a. Physical Property

Property which is directly and immediately used in providing public service causes no difficulty in valuation The "used and useful" principle is applied in determining the status of more doubtful properties. Implicit in the principle is that property which may reasonably be required for service should be included in the rate base. Standby, auxiliary, or reserve facilities acquired in reasonable amount to meet anticipated future demands, may be included in the rate base, although the property is not in use at the time. Other types of property which become subject to the used and useful principle, and require judgment and appraisal are as follows: property temporarily out of use, incomplete and contemplated construction, obsolete and inadequate property, property leased or loaned to others, property not used for general service, property for benefit of related company, property to be abandoned, property used for nonutility purposes. 1/

1/ See any Annual of Public Utility Reports for a more complete list.

Many of these will cause no difficulty, for on the whole, the types of property mentioned above are neither used or useful. However, there are sometimes peculiar circumstances which might lead to special considerations for some of the above types.

Of the types mentioned standby facilities and facilities contemplated for future use are subject to most consideration and refined measurement. Generally, standby facilities consist of older, obsolescent equipment retained to meet peak demands, exigencies, and emergencies. Valuation of these items would involve determining the difference in efficiency between the new equipment and the standby equipment. The allowance and valuation of equipment constructed and installed for future use requires judgment with reference to probability and time of use, and the courts take the position that evidence must be produced to show that the utility company has not used good judgment in constructing such properties.

Under the original cost method of valuation, items which have been entered in the books of the company are included in the rate base, but they are subject to the prudent investment principle.

With regard to land, used by the public utility, the valuation method has proved contentious. The courts have rejected reproduction cost and original cost as measures of land value, and favor what they call the current "market value" of the land. Railway counsel in the Minnesota Rate Cases argued that railway rights of way should be valued at several times the current market prices of adjacent land since railways have to pay excessive prices for land because of condemnation or bargaining procedure. 1/ The Supreme Court, however, refused to ratify such use of multipliers because it felt that the reproduction cost claimed was too high, that reproduction cost estimates in such cases were very hypothetical, and that incremental value of land arising out of its use by public utilities cannot in fairness be allowed.

The use of the current market price would in effect mean reproduction cost, and has been the subject of criticism by some writers. Two writers feel that such a basis nearly always favor the public utilities. 2/

1/ See Bonbright, op. cit., p. 1141. The Minnesota Rate Cases set the precedent in land valuation.
2/ Bigham and Jones, op. cit., p. 225.

They point out that the cost of land seldom declines, except in individual instances of communities with declining populations, and in fact rises because of the upward trend in population generally. The public utilities would in effect be reaping the benefits of general economic development. It is true that North America has undergone a period of economic expansion in the past, and the point made by the writers has validity. Its future significance will depend upon the degree of future expansion.

Another writer takes a similar view, and his argument is substantially the same. 1/ In summarizing his position he says, "The proper view of utility land or other physical property is that it was acquired in connection with a large cooperative undertaking. The investment was made for a public purpose and was expected to make other properties and business more useful and therefore more profitable. The development of any utility causes the emergence of new values because of the new uses and profits made available. But the utility itself is merely a public convenience undertaken at joint expense through which the other

---

1/ Bauer, John, Effective Regulation of Public Utilities, p. 199.

developments are obtained. And these developments would be greatly impeded if the utility valuations were to be increased in proportion to the new uses outside. If a return were allowed on valuations based upon outside developments, the burden upon other properties and industry would often be so great as to cause a collapse or prevent further development. 1/

All the writers mentioned above favor an original cost valuation of land, in keeping with their support of the original cost method of valuation throughout. There would seem to be no reason why land should not be valued on this basis when the original cost method is employed, and it would certainly be consistent with the original cost principle. In any event, it does not seem fair to allow a public utility an increased rate base because of land value appreciation arising out of both public utility use and economic expansion of the community itself.

b. Working Capital

Working capital essentially consists of current assets such as supplies, cash, and accounts receivable

---

1/ Bauer, John, op. cit., p. 200 - 201.

which are necessary for the efficient functioning of the business. An allowance for working capital is included in the rate base. Every business has to meet current obligations and to finance operations pending the collection of bills. The amount required is constant, and is determined from a study of the company's past experience in this regard, and the amount required depends upon the type of business in question; more specifically upon the credit terms the business extends. In a public utility, revenues are usually collected within one or two months, and a utility like the street railways does a strictly cash business. Consequently, the working capital allowance of a public utility will be small in relation to the rate base as a whole. The problems incident to working capital in regulation are relatively insignificant and need detain us no longer here.

It is conceivable that interest on working capital could be treated as an operating expense, and that a company could, for example, obtain the necessary funds by short-term borrowing. However, working capital requirements are fairly constant in quantity, and can rightly be considered part of the permanent capital investment of the business. Consequently it is entitled

to the return allowed capital invested in the physical properties, and an allowance is made for it in the rate base.

c. General Overheads

An appraisal of public utility properties also includes expenditures which cannot be assigned to any particular unit of property, and are known as overheads. The six main groups are organization expenses, legal expenses, engineering and supervision, interest during construction, taxes during construction, and omissions and contingencies.

Organization expenses are incurred in incorporation and preliminaries of organization of the business. They can seldom be ascertained definitely, and the amounts allowed will depend upon what assumptions as to the requisites of organization are made. Legal expenses are very similar. Engineering and supervision expenses are incurred to pay for engineering services and surveys in connection with plant construction. Engineering supervision of plant construction is also included. Such items as supervision of the installation of a single unit is not included here, for they can be imputed to the cost of the unit. Ascertainment of

engineering overheads is subject to assumptions in regard to requirements considered necessary at the time.

Interest during construction consists of an allowance for return on capital being used for construction until such time as the plant begins operations. Cost, time, and rate have to be considered in determining the allowance. The time factor seems to cause most difficulty. Taxes during construction is a similar item.

The allowance for omissions and contingencies 1/ is included because it is recognized that in any appraisal of a whole plant there are omissions and contingencies which have not been considered. Essentially, it is an item which is proposed to serve as a correction of appraisal errors. It is, of course, highly hypothetical, and further, there can be overestimates as well as underestimates.

All of these overhead costs are properly included in the rate base, no matter what method of building up the rate base is employed. Two methods are generally employed to determine these costs. One is to examine the books of the company, but this is subject to the availability and reliability of records of these

---

1/ Items of expense not readily foreseen.

expenditures. The other is to add a percentage to the reproduction cost of the physical property, a method which is necessarily hypothetical, and can make overhead expenses "the cloak under which hides a multitude of iniquities." 1/ Bauer and Gold recommend that percentage estimates be based upon reasonable average or normal conditions with reference to industry as a whole. 2/

"We have here, therefore, conditions favorable for the exercise by the public utility experts of their special talents; and the outcome is likely to be unfavorable to the public interest unless the commissions and courts keep their wits about them." 3/

d. Nonphysical Elements

(i) The Going Concern Theory

It is recognized that valuation involves inclusion of intangible nonphysical properties as well as tangible physical property. The basis for such recognition is that items should be valued with relation to their use in the concern itself, instead of being appraised at market value with relation to their use for any purpose

---

1/ Bigham and Jones, op. cit., pp. 229-230, quoted from P.U.R. 1917 B, 1, 82, Illinois Public Utilities Commission
2/ Bauer and Gold, op. cit., p. 183.
3/ Bigham and Jones, op. cit., p. 229.

in general. According to this view property becomes not tangible things, but business relationships. 1/ It is called the going concern theory in regulation and valuation.

A going concern does not include merely the investment or the physical plant of a business. It includes a variety of relationships; economic and financial, industrial, and legal. The economic efficiency and profitability of a concern depend upon the prices that have to be paid for capital, labor, and input, upon the management employed, and upon the industrial or engineering efficiency of the plant. They depend also upon the demand for output. Legal considerations arise with incorporation, or inception of the business, with taxation, with franchises and privileges of a similar nature, with enforcement of contracts, and so on.

To deal with the idea of going concern value more specifically, it is necessary to examine briefly the development of a business. Several stages are discernible. First, there is a period of preliminary organization involving the ascertainment of business

---

1/ Glaeser , M. G., Outlines of Public Utility Economics, pp. 324-325.

opportunity, the assembling of the physical plant, and the acquisition of funds to put the physical plant into operation. Second, there is the period of construction when the assembly plans are put into execution, and the physical plant is acquired. Third, the entrepreneur must build up his market, and in many cases he may have to "create" his own demand by advertising and publicity. Finally, the enterprise becomes a "going concern", and, if it has been successful in its efforts through the first stages, finally reaches the point where revenues should exceed expenditures. 1/

The building up of a business so that it becomes a "going concern" involves costs of various sorts. This is recognized in determining rate bases of public utilities, but such recognition also gives rise to problems of selection and caluation of items. It becomes necessary to distinguish between earning capacity arising out of costs such as promotion and organization costs necessary to attain going concern status, and earning capacity arising out of special privileges or out of the monopolistic position of the utility. The latter are not admitted as part of the

---

1/ For a detailed treatment of going concern see Glaeser, op. cit., Chapter V.

rate base, while the former are, but it is more difficult than it seems to get a clear-cut, consistent distinction, especially since the law insists that all relevant elements shall be considered in fixing a rate base. Bonbright takes a rather uncharitable view of legal procedure when he says, "The opinions of courts on the valuation of intangibles are both the fascination and the despair of students of rate-making theory. They show the courts at their worst in their efforts to reconcile the doctrine that the rate base should be measured by value, with their inconsistent rulings that this value must be measured without reference to realized or prospective earnings." 1/ The difficulty is that present procedures seem to call for the determination of a rate base that expresses value in the sense that such value is the outcome of earning capacity, yet rules out consideration of such earning capacity in arriving at value. The use of earning capacity as a determining factor in setting a rate base was considered and found invalid in the preliminary discussion of value; the fundamental cleavage existing between the economist's value and the jurist's value was also pointed out. Thus present procedure poses a dilemma

---

1/ Bonbright, op. cit., p. 1142.

which demands a solution when intangibles have to be valued. Franchise value and good will have been outlawed for reasons we shall point out presently. But the going concern theory has supplied a convenient back door by which these items can slip in the rate base.

(ii) Franchise Value

"Franchise value represents the value of the privilege to occupy the streets and highways with public utility properties, and to supply the people with service at reasonable cost." 1/ This value has been the subject of much controversy. Representatives of the public contend that it is nothing but monopoly value, the very thing regulation intends to abolish, and also that the public should not have to pay for what it has itself granted. This argument can be further strengthened by pointing out that franchises can be withheld if rates are not reasonable, and such a determination of reasonable rates is implicit in rate base making. Counsel for the utilities have based their arguments upon the legal and traditional

---

1/ Bonbright, op. cit., pp. 1146-1147.

rights of property, pointing out that franchises have been regarded as property in other fields of law, and have indeed been taxed; consequently, omission of franchise value from the rate base would constitute the "taking" of property "without due process of law." The position taken by the lower courts and commissions is that no specific allowance is permissible for franchise value. The position of the Supreme Court is not clear. 1/ The utilities have found another avenue open to them in making claims for going value.

Under the original cost method of valuation, no allowance would be made for franchise value unless the company actually paid for the franchise; under reproduction cost no allowance would be made unless the company would have to pay for the privilege in reproducing the property. A franchise is given subject to the condition that rates are to be reasonable; if earnings are in excess of such rates, the franchise has a market value, because of the monopoly position the company enjoys from the franchise privilege. The regulating body will then take steps to reduce rates, and one step in so doing is to make no allowance for

---

1/ Bonbright outlines the controversy, op. cit., pp. 1143-1145.

for franchise value in the rate base. The whole matter is but another instance of earning capacity creeping into a "valuation" that is designed to determine earnings.

(iii) Good Will

Good will is "the competitive advantage of a business that has established friendly customer relationships." 1/ Thus good will is an asset which can properly be found only in competitive business. Consequently, insofar as public utilities are monopolies giving "indispensable service", good will is not an allowable item in their rate bases. Any other course would see earning power entering the rate base, the basic regulatory determinant of a public utility's earnings. The courts and commissions are emphatic too on this question, and make no allowance for good will. 2/

However, the question of good will becomes relevant wherever public utilities are operating under competitive conditions, and wherever friendly customer relationships

---

1/ Bonbright, op. cit., p. 1146.
2/ Wilcox v. Consolidated Gas Company (1909) is the basic precedent, 212 U.S. 19, 52 (1909). The Supreme Court said: "The complainant has a monopoly in fact, and a consumer must take gas from it or go without. He will resort to the 'old stand' because he cannot get gas anywhere else." See Bigham and Jones, op. cit., pp. 237-238.

have a decided effect even upon the earnings of a monopoly. 1/ Here is another element which enters into going value more or less insidiously. 2/

(iv) Other intangibles

Besides good will and franchise value there are some more specific intangibles to be considered briefly before we go on to a discussion of going concern value. These are water rights, leaseholds and easements, leases of plant, and patent rights. In general, it can be said that these are allowed in the rate base if the company has to pay for these items. 3/

(v) Going Concern Value

In connection with going concern value Bonbright says:

"If franchise value is to be excluded because it smacks of monopoly, and if good will is deemed non-existent because it implies competition, there may seem to be little left on which the companies can hang a claim for a value of the entire property in excess of the depreciated costs of the physical assets. But the case is not so hopeless. Enter 'going value' or 'going-concern value'." 4/

1/ Bonbright, op. cit., p. 1146.
2/ Ibid., p. 1146. In one case, it was pointed out that the "fine public relations" of the company was a factor to be considered under the allowance for "going value." McCardle v. Indianapolis Water Co., 272 U.S. 400 at 414 (1926)
3/ Bauer and Gold, op. cit., give a detailed treatment of these questions in Chapter XI.
4/ Bonbright, op. cit., p. 1146.

Going value is an element of value that is a characteristic of the business as a whole. It has been recognized by the courts as a legitimate allowance in the rate base. The Supreme Court tends to regard going value as the difference in value between a plant which has developed its earning power and an identical one which has yet to do so.

The legal basis for this concept lies in the law of condemnation where it is recognized that a developed business is worth more than an undeveloped one. However, this notion is subject to the objection of earning power entering into rate base determination, when the rate base is designed to determine earnings. Nevertheless, there are several concepts of going value to be considered before one can ascertain the validity of its inclusion in the rate base. Here too is a source of difficulty since there seems to be no commonly accepted definition of going value, nor have the courts attempted to make one, though providing for its inclusion in the rate base.

First, going value is thought of as a distinct, additional value over and above the appraised items, a value arising out of the existence of a successful business. "It is the special value of attached

customers, seasoned organization, system of records, and all other factors of management and operation that together produce a self-sustaining enterprise." 1/ This concept of going value ignores the fact that in public utility regulation procedure we are not ascertaining value as such, but the rate base, the amount upon which earnings are to be allowed; in other words, this concept would be merely good will in the guise of going value. The rate base is determined by cost either original or reproduction, and therefore only costs actually or likely to be incurred would reasonably be included. Under original cost, actual costs incurred in establishing the business and building up a market would be justifiably included. Under reproduction cost, one would include such costs as would be likely to be incurred in reproducing the business.

The matter of costs here raises questions as to accounting procedures and fairness to the consumer. If the costs above have already been charged to operating expenses, they have already been recovered from rates, provided such rates have been sufficient. In such a case, the costs cannot in fairness to rate payers be

---

1/ Bauer and Gold, op. cit., p. 303.

included in the rate base. If the costs have been charged to capital account, they are properly included in the rate base. Further, the question arises as to what should be allowed where the company has not been able to recover the costs from rates. This leads us to the second concept of going value.

Going value, in the second sense, is a cost concept rather than a value concept. It has been pointed out that in rate base determination, the value concept cannot be admitted, and that any allowance for such "value" can be permissible only if it can be shown that such value has resulted from costs. Going value thus becomes a cost concept, 1/ and is defined as "the uncompensated losses incurred in the development of the business" or as "the amount equal to the deficiency of net earnings below a fair return on the actual investment due solely to the time and expenditures reasonably necessary and proper to the development of the business and property to its present stage." 2/ The going value here would be determined by subtracting the gross earnings

---

1/ Value and cost are, however, not synonymous, and the use of the term going value as a cost concept is not accurate terminology.

2/ Bigham and Jones, op. cit., p. 230. The second definition was formulated by the New York Court, and quoted by Bigham and Jones.

as from the inception of the enterprise from the total operating expenses, taxes, and fair return. If the gross earnings equal or exceed the latter, there is no going value. If there is a gross deficit, this would be called the going value. Under original cost, going value would be determined from the books and records of the company, if these are adequate and reliable; if not, estimates would become necessary. Under reproduction cost, estimates of the losses that would be incurred by a hypothetical, new company during its first period of operation would be used.

Under what circumstances can these deficits be included in the rate base? The answer to this question centres around the date the company came under regulation in relation to the date of inception of the company. If the company has been operating for a long time before regulation, and has not been able to recover all costs, it is not entitled to consideration. The reason for this is that a company which has more than recovered costs is allowed to retain surpluses since nothing can be done anyway to seize these except by deducting such surpluses from the rate base. One can see that this is diametrically opposed to going value in the value sense. But some companies have reinvested

their surpluses in the business, while others have paid them as dividends. In other words, if companies are entitled to the profits they made before regulation, they must also sustain losses. It is a risk which investors have to take.

The case is otherwise where the company has been regulated from the beginning of its life, or from a time shortly after. Here we have to recognize the right of the company to recover losses incurred while under regulation, for otherwise capital would not be forthcoming and the reasonable expectations of past investors would not be met. But a word of caution is needed. Such a principle does not mean that the companies are to be guaranteed a return and allowed to charge excessive rates regardless of the causes that lead to deficits. 1/

In actual practice, allowances for going value continue to be made as a percentage of the physical

---

1/ Bigham and Jones quote an extract from a decision of one commission: "When such deficits are due to abnormal conditions, or when due to bad management, defective judgment, extravagance, lack of ordinary care and foresight, unduly high capital charges, and other causes of this nature, it is manifestly clear that they should be accorded little or no consideration in either the valuation or the rates." 4 Wisconsin Railroad Commission Reports 501, 586 (1910). See Bigham and Jones, op. cit., p. 231-232.

valuation. The Supreme Court "has declined to identify 'fair value' with any kind of cost." 1/ The courts and commissions in general have not laid down any definite principles to follow in arriving at going value. They have not recognized past losses, but have instead tended to make allowances in the other direction for businesses which have built up successful concerns. This works an injustice to consumers and cannot in any way be called "fair value." 2/ The companies concerned have built up a successful concern by using income derived from rates in the past. To allow for going value under such conditions constitutes "double counting" against consumers.

The problem of going value, and indeed of non-physical elements as a whole illustrates the confusion existing in rate base determination procedure. Fundamentally, the confusion arises from misconceptions arising out of the various uses of the word "value". If it were uniformly recognized that value in the sense of market value or value to the owner cannot be used to build up a rate base, but that instead it were recognized that a rate base is merely a device used to

---

1/ Bonbright, op. cit., p. 1149.
2/ See Bonbright, op. cit., p. 1151, and Bauer and Gold, op. cit., pp. 335-337.

determine the rates that are going to be sanctioned, many of these difficulties would disappear. A cost approach, throughout, be it reproduction cost or original cost, uniformly applied would greatly minimize lengthy, involved court hearings and secure greater fairness by conformity to expectations of both consumers and investors.

C. The Rate of Return

1. General Considerations

When a rate base has been determined, a "fair" rate of return must be set by the commission. The rate of return is entirely subject to judgment based upon conditions which may be considered relevant. It is just as important as the rate base in determining the income of the company, and the rates consumers pay. If one assumes a rate base of $100,000,000 and a rate of return of 6%, the total return becomes $6,000,000. A reduction of the rate base to $90,000,000 and an increase in the rate of return to 6 2/3% will yield the same return. Yet there is far more argumentation over small items in the rate base than over a one per cent change in the rate of return, the latter being a very significant change indeed. If the rate of return were 6% and it were increased to 7%, the increase, assuming a constant rate base, would amount to 16 2/3% of the former total return. Nevertheless, the rate base occupies most of the time and effort of all the parties concerned, while the rate of return gets relatively little attention, and is a matter that is usually disposed of at the end of hearings of rates. One is tempted to believe that the sanctity with which property is regarded is

partly responsible, yet seemingly small changes in the rate of return can influence greatly the fortunes of a company. Probably more considerations are thought relevant in determining the rate base than in determining the rate of return.

2. Definition and Concept

A "fair" rate of return, from the economic point of view, is "one which under honest accounting and responsible management will attract the amount of investors' money needed for the development of our public utility facilities." 1/ The legal viewpoint agrees substantially with this concept of a "fair" rate of return. 2/ The rate of return is determined after operating expenses (including depreciation) and taxes, have been provided for. The cost items that have to be met from the rate of return are interest on funded debt and other liabilities, dividends upon issued stock, the amortization of discount, brokerage, and other financing expenses wherever these are not included in property value, and finally, the rate of return should

---

1/ Bigham and Jones, op. cit., p. 253.
2/ Koontz, op. cit., p. 331. The Supreme Court elaborated on its position in the case of Bluefield W.W. and Imp. Co. v. W. Va. 262 U.S. 679, 692-93 (1923).

allow for rate stabilization and surplus requirements. 1/

With regard to "honest accounting" is meant proper accounting procedures in dealing with all these items, especially with reference to depreciation and operating expenses. If repairs, replacements, and depreciation which is not taken care of by replacements are not charged to operating expenses, profits will be overstated in the books, and if distributed to stockholders they, in effect, are getting part of their capital back. If additions and betterments are charged to operating expenses, book profits understate actual profits and, in effect, the public is providing the company with more capital.

A number of factors have to be considered in determining the rate of return. The capital structure of the company has to be safeguarded; the particular company and time deserve attention, while incentives and risks are basic considerations. Attention will accordingly be given the above here, though obviously, these factors are just as relevant in dealing with the rate base.

1/ Nash, L. R., op. cit., p. 224.

3. The Capital Structure

The capital structure of a public utility company is usually determined by management, though bond and stock issues are subject to regulation. The management of any company tries to adapt its capital structure to attract the various types of investors, not for the sake of the investors, but to secure funds on the most advantageous terms possible. Sometimes this is best done by bond issues which appeal to the more conservative investors, and sometimes by various types of stock issues which appeal to more speculative investors.

It is sometimes argued that the capital structure of a public utility should be recast so as to include as many low-interest bonds as possible. This, it is said, would lower the costs of the utility. The fallacy in such an argument is that if bonded indebtedness is high, bondholders are taking greater risks, and will have to be paid a higher rate of interest if their capital is to be forthcoming. The presence of high fixed charges is an element of risk that cannot be overlooked here.

At the other extreme, company counsel have argued that the rate of return should be set at the rate which

will attract investment in common stock. This, of course, would enable the management to trade on equity with highly satisfactory results to the common shareholders. Suppose a rate of 8% is deemed necessary to attract $10,000,000 from common stock, and also that this percentage is also set as the fair rate of return. Suppose further that only $3,000,000 is raised by common stock issues, and $7,000,000 by bond issues at 5%. The company is entitled to a return of $800,000 of which $350,000 is paid as interest, $450,000 being available for dividends on common stock. This is a return of 15% on common stock, obtained by trading on the equity. 1/

The conclusion one reaches is that it is not advisable to set the rate of return with reference to either bond interest rates or common stock returns alone. It would seem that a weighted average of the rates on the different forms of investment in the capital structure should be worked out. Such calculations are made by commissions with reference to the capital structure of the particular utility under consideration. If a hypothetical capital structure were used as a model, one can surmise the effect upon the initiative

---

1/ See Bigham and Jones for elaboration, op. cit., pp. 274-278.

of management. There is probably no ideal capital structure that fits all types of utilities, and commissions are better advised to accept the capital structure as it exists, if upon investigation, it appears sound. 1/

4. Risk

The rate of return must include pure interest plus a differential return in keeping with the risks assumed. Pure interest is presumably the return on "safe" securities, that is, securities offering the highest degree of safety attainable as evidenced by past performance and favorable future prospects. The rate varies over time, but is the same for all long term investments. The risk differential depends upon the class and type of security, upon the type of industry, and upon alternative investment opportunities. The stockholders are the parties most immediately concerned with the risk elements of an enterprise, and in fixing the rate of return, the risk differentials

---

1/ In the B.C. Electric Case (1942), the commission used a weighted average of returns on different types of capital in the capital structure, instead of the more usual method of determining alternatives. See Currie, A.W., "Rate Control of Public Utilities in British Columbia," Canadian Journal of Economic and Political Science, August, 1944, pp. 388-390.

must be set so as to make investment in stock attractive.

There are various risk elements. Each industry is subject to physical hazards peculiar to it. These hazards are generally provided for in depreciation. More intermittent in their character, but closely allied to physical hazards are property destruction from fire, flood, storms, earthquakes, washouts, and so forth. Street railways have additional costs arising out of accident claims. Gas plants are susceptible to explosions. Some of these risks can be covered by insurance; others can be reduced by efficient management. Nevertheless, they all require attention in the rate of return. Natural gas is a utility which is peculiarly subject to conditions affecting the source of supply. It is difficult to estimate closely the life of a gas field, and hence difficult to determine the proper rate of return to provide for the amortization of the property. This problem is essentially the one discussed under depletion and depreciation. Ruggles, who discusses the problem, confesses that in the end, "it is extremely difficult to fix a fair rate of return for such a utility." 1/

1/ Ruggles, C.O., "Problems of Public Utility Rate Regulation and Fair Return," Journal of Political Economy, Volume 32, 1924, pp. 543-566.

A very significant risk also arises from technological advance. The nature of this risk has been discussed under depreciation, and a large part of the risk will be provided for in depreciation allowances. Nevertheless, prospective investors realizing such risks, expect a return in accordance with the risks, and therefore, the rate of return must take them into account. One should note that technological improvements in industries providing potential substitute services, and entirely new inventions affect the risks in a given industry.

Another risk element arises from the past performance of a company, or the age of it. Investors will take a lower return from companies which are well-run and well-established, while they expect a higher return from younger companies, and from those which do not have a good past record. Accordingly, it is likely that in fixing the rate of return for a newly established utility or for one which has had inefficient management in the past, a higher rate is necessary. In the latter case, a commission will have to take measures to improve management efficiency, but improved efficiency will have to be demonstrated before investors become willing to accept a lower rate of return.

The character of the community served by the utility has a definite bearing on risk. Population may be stationary or fluctuating; the community may be dependent upon one industry for its economic life, or its economic activities may be seasonal, regular, or stable. These will have a bearing upon the rate of return.

Business cycle hazards have a more general bearing upon the rate of return, because they tend to affect all utilities everywhere. Rising price periods result in higher costs of operation and associated with such periods are higher interest rates. Here commissions have to act quickly in increasing the rate if capital is to flow into the utilities. An outstanding example of what can happen is found in the experience of the American railroads during and after World War I when rate increases became effective only after the peak in the price level had been reached, and deflationary tendencies were manifesting themselves. 1/ The effects of the business cycle vary with individual utilities. Demands of various utilities differ, the demand for water being the most stable. Electric and gas utilities,

---

1/ In this case the effects were far-reaching. The prices and outputs of goods generally were affected, and hence there was a significant effect upon investment in general.

if they rely heavily upon industrial markets, will find the demand for their services a fluctuating factor. The rate of return has to be fixed accordingly. Cessation of demand is associated more with technological change, and is an element in depreciation allowances.

Finally, the attitude of regulating bodies can influence investors' estimates of risk. If regulatory methods are inconsistent or unfavorable toward investors, the rate of return has to be higher. In the latter event, the regulating body would have to revise its attitude toward investors if the utilities regulated are to secure capital for development. Inconsistent procedures lead to uncertainty, and a strong argument for consistent methods is that the rate of return required to attract investment can be lowered, with subsequent rate reductions for consumers.

In general, one can see that in order to take the risk elements into consideration, the various elements affecting the particular utility have to be scrutinized. No hard and fast formula or rule-of-thumb can be applied. In addition, comparisons with returns in unregulated industries are implicit in the fixing of a rate of return to allow for risk for it is held that the risks generally are smaller in regulated industries than in

in unregulated ones. This is because public utilities provide essential services or products; they are monopolistic; the demand for their services is fairly stable. Commission regulation, by grants of monopoly, by control of security issues, by insistence upon proper accounting procedure, and so forth, also reduces risks. 1/

5. Incentives to Efficiency under Regulation

One of the unfavorable consequences of regulation is the possibility of indifferent management when rates are fixed and limits are imposed. This possibility is admitted by regulatory commissions, and it is generally conceded that incentives to efficiency should be provided. 2/ But few commissions have actually attempted to reward efficiency; there is a tendency to treat management efficiency as being uniform. Glaeser suggests that the inflexible nature of commission regulation explains this; rates once fixed remain so

---

1/ Bigham and Jones, op. cit., pp. 258-259.
2/ The Illinois Public Utilities Commission said in 1916: "A utility which is excellently managed, progressive in development, alive to the public requirements, aggressive in securing new business, economical in operation, courteous to consumers, and fundamentally honest in all transactions, should receive greater consideration, in the utility of which the reverse is true." P.U.R. 1916 C, 281, 382-383. See Bigham and Jones, op. cit., pp. 263-264.

until changed. He also adds, "If, in the meantime, costs have declined because of efficient management or for other more general causes, the well-managed enterprises have not been disturbed in their enjoyment of an increased earning capacity through the deliberate act of the commissions; on the other hand, customers being satisfied with the treatment accorded them, have failed to make applications for rate decreases." 1/

The provision of incentives means working out a practical, feasible system of rewards. There is first of all the question of who shall be rewarded. Shall it be the stockholders or the management or both? The apportionment of control secured by the capital structure is significant. In the final analysis it is the common stockholders or a particular class of these who receive the benefits of efficiency in unregulated industry. How much influence do they have upon the efficiency? Are corporations in the end run by a few, or do all holders of voting stock exert perceptible power? Clark takes the position that control is vested in the large stockholders, because they choose the directors, chiefly themselves. 2/ The directors in turn choose management officials. "This last is a function which can never

---

1/ Glasser, op. cit., p. 433.
2/ Clark, J.M., Social Control of Business, p. 322.

become negligible ... It is better to choose the right man for general manager than to choose the wrong one and place him under the most perfect scheme of efficiency premuims that could be devised. Whoever does this choosing should have reward enough to make it worth his while to pay serious attention to it ..." 1/ Thus, if stockholders choose management, they should bear the losses from bad management, and also reap the profits from good management. If this position is well taken, rewards to stockholders would be provided for in regulation, rewards which would be forthcoming only if they choose efficient managing officials. The question of incentives to these officials need not then be dealt with by commissions.

Bigham and Jones propose a scheme of incentives. 2/ In brief, they suggest that any surplus earnings be put into a dividend reserve to meet any future deficiencies that may occur. This surplus will arise from the company's ability to reduce operating expenses, and

---

1/Clark., p. 322. F.H. Knight points out that "in organized activity the crucial decision is the selection of men to make decisions, that any other sort of decision-making or exercise of judgment is automatically reduced to a routine function." See his Risk, Uncertainty, and Profit, p. 297, and Chapters 9 and 10.
2/ Bigham and Jones, op. cit., pp. 264-268.

in part from its ability to earn more than the estimated return from the rate structure drawn up. Consumers benefit not only from efficient service, but also because regular dividends in the long run lower the cost of capital. Efficiency would be rewarded by allowing an increase in the rate of return where surplus earnings due to special efficiency can be demonstrated.

Most writers do not favor penalizing inefficient management. Since commissions generally assume that a company is well-managed in fixing the rate of return, badly managed companies find they cannot earn the allowed rate anyway. Here is incentive enough to improve management. Penalizing bad management would also increase risks, and hence the cost of capital. Finally, there remains the difficulty of ascertaining objectively whether management is good or bad. Bigham and Jones also suggest that penalizing inefficiency might involve the courts in many controversies over management efficiency. 1/ On the other hand, positive inducements would lead to no litigation over property confiscation.

The question of incentives is not confined to a consideration of the rate of return alone. The method

---

1/ Bigham and Jones, op. cit., p. 268.

of valuation and depreciation policy influence the incomes and risks of the various investors. Nevertheless, administratively, adjustments for incentives are most flexibly made in the rate of return. The basic consideration is the capital structure of the company in its apportionment of income, risk, and control.

6. Taxes

Taxes are generally considered an operating expense. However, taxes on corporation income can raise problems in connection with the rate of return, depending upon the regulations and tax structures of the state or province or country in which a utility operates. The Supreme Court of the United States has taken the position that all taxes shall be considered before the fair rate of return is determined. 1/ Thus income tax is deductible from revenue to reach the amount of return. However, such deduction shall be considered in setting the rate of return which accordingly will be lower. 2/ It should be noted here that dividends received by stockholders were exempt from the federal income tax before World War II. The treatment of these taxes in

---

1/ Bigham and Jones, op. cit., pp. 270-274.
2/ Galveston Electric Co. v. City of Galveston, 258 U.S. 388, and Georgia Ry. & Power Co., v. Georgia Commn., 262 U.S. 625. See Bauer and Gold, Public Utility Valuation, pp. 357-358.

considering the rate of return, in the final analysis, depends upon existing tax regulations. 1/ Individual bond income was subject to income tax; the existence of this tax was considered by bond purchasers, and would presumably be reflected in the market prices of bonds.

The corporation tax problem has been met with in Canadian cases. In a recent case in Alberta, the Board felt that "all income tax, normal or abnormal, should be allowed as an operating expense but that due regard should be given to this factor when fixing the rate of return." 2/ The Board makes certain qualifications, however as follows:

"A tax of forty per cent in wartime related to a tax of twenty-two per cent in peace time can be regarded as an excess profits tax in public utility matters. In the interests of equitable distribution of the tax burden such an abnormal tax should not be imposed in upon the utility customer.

The Board is of the opinion that some relief from this burden should be given to the utility customers and is of the opinion that in abnormal times and under abnormal conditions the company should bear a fair proportion of the burden imposed by a war which protects its very existence, just as the oil operators are bearing their share of the same burden for the same protection. The Board, however, is of the opinion that the incidence of the tax should be reflected in the rate of return, rather than by allowing as an operating charge an amount less than the actual income tax imposed. The Board is therefore of the opinion that the rate of return should be reduced from nine and one-half per cent to eight per cent per annum." 3/

1/ Bernstein, E.M., "Public Utilities and the Income Tax", Quarterly Journal of Economics, Volume 45, 1930-31, pp. 529-535.

2/ Valley Pipe Line Company inquiry, Public Utilities Board of Alberta, Decision, Volume 27, page 95.

3/ Valley Pipe Line Decision, p. 96.

Wider implications as to tax incidence and public utility operations were brought out in the B.C. Electric Company hearings. Commenting on this case, A.W. Currie says, "Reduction of public utility rates at the expense of the federal government raises problems in theory as well as in national unity." 1/ This statement needs elucidation and accordingly the main facts of the case will be outlined.

Excess profits taxes estimates are derived from standard profits calculations with the years 1936-39 as the base. The Company's revenue during these years was relatively low. In 1942, the Company received an amount less than the authorized return after paying Dominion taxes. Any increase in rates would result only in an increase in these taxes, and would be of no benefit to the Company. Before payment of Dominion taxes the return was in excess of the authorized return. In view of the existing abnormal conditions and the time and expense involved in changing rate structures, the Commission ordered the cancellation of domestic and commercial electrical bills and small power bills for one month. The effect of this cancellation was to

---

1/ Currie, A.W., "Rate Control of Public Utilities in British Columbia", The Canadian Journal of Economics and Political Science, Volume 10, 1944, p. 370.

reduce the amount of taxes payable, but the net revenue of the Company was not reduced. Currie puts the matter as follows:

"In other words, consumers of electricity (but not of water, gas, or transportation) from the B.C. Electric received a temporary reduction in rates at the expense of the Dominion government. Though this may seem unpatriotic in war-time, it must be remembered that nothing corresponding to income tax is levied on publicly-owned utilities. The Dominion Treasury collected nearly $6 million from the users of electricity in British Columbia in 1942 and not a corresponding dollar from users in Ontario. According to the Commission, this is the biggest individual cause of the differential in rates in the two provinces. The rebating of one or two months' bills per annum has been a common practice in certain cities in Ontario. These rebates also reduce Dominion revenue because the sales tax levied directly on the consumers of electricity is eliminated. The Order of the B.C. Commission had the effect of cancelling both the sales tax, and the excess profits tax which publicly-owned utilities escape entirely along with income taxes." 1/

It can be seen from the case above why the tax structure is a relevant consideration in dealing with the rate of return. It can also raise problems which commissions cannot deal with adequately.

7. The Rate of Return and Procedure

The rates actually set by commissions vary from 5 to 9 per cent, averaging around 6 per cent. The courts have tended to look unfavorably upon any rate below 6 per

---

1/ Currie, op. cit., p. 389.

cent because they fear that such rates may be termed confiscatory.

The determinants of the rate of return have been discussed. They are the general rate of interest, the risks of investment, and special impositions like taxes. Commissions are left to select the factors relevant in this regard.

A regulated public utility is usually a monopoly. Also, it is usually rendering an indispensable service. Consequently, certain risk factors are absent which justify a somewhat lower return than that obtainable in non-regulated industry subject to competition. It becomes implicit in regulatory policy to fix rates which allow the utility no more than is necessary to provide for efficient service and to attract capital. Yet certain risks remain as has been pointed out. One of these may be the development of competitive substitutes which can result in a falling off in the demand which may render the utility unable to earn the allowed rate of return. An example is the plight of many electric street railways. It is expected that utilities are to assume such risks and the rate of return is set accordingly. Further, incentives to efficiency need recognition, and the reasonable expectations of investors

have to be taken into account. If the rate of return does not allow for these factors, the utilities will sooner or later run into difficulties; investors will simply refuse to provide the capital if failure should become common among utilities, and if the rate of return is unsatisfactory with reference to the responsibilities and risks that the utilities must assume. Regulatory bodies, then, take stock of the situation and set a return accordingly. If they do not wish to do so, they will have to leave the utilities complete freedom in setting their rates.

The alternative remains to let the consumers or the state bear the risk. Here the utilities might still be run by private management with all losses guaranteed by the state. The rate of return would then be low. Or, steps may be taken to transfer the utilities to public ownership, the state getting the profits and assuming the losses. So far in public utility regulation, there have been few attempts to adopt this alternative. The basic fact remains that the party bearing the risks and responsibility has to be rewarded in accordance with these.

A vexing question, however, arises. The common stockholders are generally assumed to be the residual

risk takers. How can a commission reward them when a more or less fixed rate of return is imposed, granted further that such a return is ample generally? Common stockholders expect to win or lose while preferred stockholders and bondholders want a definite rate, expecting to obtain no more and no less than this. The question here is one of incentives which was considered but for which no adequate solution has been found. The price level is significant here too. It is one of the elements considered by common stock investors. Reproduction cost advocates maintain that this matter is taken care of in adopting a reproduction cost method in fixing the rate base. The weakness of this method, however, in this respect, is that it may lead to abnormally high returns or to no return at all for significantly long periods with serious consequences to public utility operation. Some writers propose a fluctuating rate of return in keeping with the price level. This would provide a constant dollar income for common stockholders. The disadvantage of this proposal is that the rate of return may become so high as to lead to public pressure on the commissions to lower it; it may become so low that the courts consider the rate confiscatory. These are political rather than

economic objections, but they are relevant.

The fixing of a rate of return raises many problems because so many different parties and interests are concerned, and because no objective measurements for determining it have yet been devised. A scientific analysis of the rate of return is difficult to make since so many factors influence it.

D. OPERATING EXPENSES

Commissions have paid relatively little attention to operating expenses. It has been felt that too much attention in this respect would constitute interference with management. However, attention has been paid to several aspects of operating expenses.

First, accounting control has been undertaken to ensure a consistent depreciation accounting policy so that rate base determination can be facilitated. Thus, commissions require that annual depreciation charges be made. Also, regulations have been laid down to guide companies in charging items to either expenses or to capital. Additions and betterments, for example, must properly be charged to capital account.

Second, the growth of holding companies has led commissions to examine operating expenses more closely. For example, a public utility may buy equipment and services from other subsidiaries of the same holding company, at inflated prices. This results in higher operating expenses and hence higher rates to consumers, while the holding company profits from the inflated prices charged. Commissions found this a difficult matter to deal with until the Federal government of the United States passed the Public Utility Act of 1935,

providing for control of holding company abuses. 1/

Third, the salaries of management are the subject of scrutiny, especially where management seems to have much control over the enterprise. Finally, commissions are called upon to question the propriety of certain items of expenditures.

1/ For a summary of the provisions of this act, see Koontz, op. cit., pp. 362-369.

E. THE RATE STRUCTURE

The regulation of rates involves (1) the establishment of a general level of rates which will, in the long run, compensate the productive agents, and (2) the adjustment of particular rates such that (a) the total return as fixed in (1) above is earned, and (b) the particular rates are reasonably differentiated. The first problem is dealt with in the determination of the rate base and the rate of return. The second problem is met by the construction of a rate structure for the public utility. An adequate discussion of the principles and techniques of rate structure construction is outside the scope of this work, and only a very brief summary of basic principles is attempted.

The rate structure of a public utility is constructed to meet the demand of several classes of consumers in such a way that the rate level is earned. 1/ The demand curves of the different classes or markets differ in elasticity and position. This condition, along with the monopoly position of the utility, makes rate discrimination possible. Greater sales can be made in the markets where the demand curves are at a

---

1/ It is assumed it would be possible for the regulated utility to earn more than the allowed return if it were left alone.

higher level or where the elasticity of demand is greater; smaller sales are made in the remaining markets. If the utility were free to maximize revenue, it would apportion total sales so as to equate the aggregate marginal revenue from all the markets with the marginal cost, and so as to equate the marginal revenues in each market with one another and with the marginal cost of the whole output.

A different rate will prevail in each market. Other things being equal, the higher the position of the demand curve or the more inelastic is the curve, the higher will be the rate; conversely, the lower the position of the curve or the more elastic it is, the lower the rate. Thus some rates will be above the aggregate average revenue for all the markets; others will be below. Rate discrimination thus exists, and it may well be that rates as between different markets will differ by a large margin.

The cost situation needs examination too. Public utilities have a high proportion of investment costs to total costs and relatively high overhead operating costs. 1/ As a result, costs tend to decrease as output increases.

1/ Telephone service seems to be an exception.

increased sales are therefore desirable from the cost viewpoint. The addition of another class of consumers will lead to increased output and lowered costs. The aggregate average revenue will be lowered, and no class of consumers will have to pay higher rates, and, indeed, rate reductions for all may be in order.

It would seem that a regulated monopoly should base its rates upon a basis of the cost of supplying each consumer or market. However, because of the large proportion of overhead costs, the phenomenon of joint costs exists, and such costs cannot be apportioned scientifically to each consumer or market. The conclusion in the last paragraph can now be restated. The proportion of total costs imputable to each consumer or market varies with the quantity produced and sold. By making sales at rates below total average cost, but above the additional cost incurred, and if such sales could not be made otherwise, average fixed cost is reduced, and total average cost is lowered for the benefit of all. Thus rate discrimination is justified in public utility rate making.

Another point requires comment. A regulated utility would not be free to maximize revenue by the equating of marginal cost and aggregate marginal revenue. Rather, the aim of regulators would be to secure such an adjustment of rates that average cost and aggregate average revenue are equated. It is assumed that the "fair return" is included in the cost curve.

There are many implications arising out of the discussion above. They could be worked out in detail, and a thorough diagrammatic analysis of price discimination as applied to regulated public utilities would be an interesting exercise in economic theory. 1/

In practice, public utilities attempt to ascertain costs of providing service for the various classes. Costs are classified as follows: (1) readiness-to-serve costs, which include outlays for equipment; (2) production costs, which include outlays for producing the service; and, (3) customer costs which are outlays of an administrative character, such as outlays for meter equipment, meter-reading, billing, and collection. Readiness-to-serve costs are joint costs, and any allocation of such costs to the different classes is

---

1/ See Robinson, Joan, The Economics of Imperfect Competition, for a diagrammatic analysis of price discrimination.

arbitrary. Production costs and customer costs are more readily allocable.

A complete discussion of rate structure would entail the consideration of each kind of public utility separately. 1/

The courts and commissions do not object to the principle of discrimination, and discrimination is found legal unless it is unreasonable. Some of the features of discrimination the courts have found unreasonable are flat rates, free services for municipal or charitable purposes, and special contracts with large users. Flat rates are objected to because it is felt that they do not give enough consideration to cost. Free services throw the incidence of costs upon other users. Special contracts may give rates which are not justified by costs. Further, some industries may be given undue advantage over others, the most serious consequence then being a maldistribution of productive resources.

The construction of the rate structure is the last and most technical step in the process of regulating rates. It has to be dealt with within the limit imposed by the rate level allowed, and is subject to the economic principles of overhead costs.

1/ See Nash, L.R., Public Utility Rate Structures, for an adequate treatment; see also Bigham and Jones, Principles of Public Utilities, for an extended discussion.

F. THE RATE LEVEL and the LAW

Before passing on to a consideration of the rationality of present procedures, it may be worthwhile to review the position of the courts in dealing with regulation. The courts in the United States and in Canada are mainly concerned with tests of confiscation and reasonable rates. Companies which deem themselves harshly treated by commissions have the privilege of appealing the decisions of commissions to the courts. This, while giving protection to private property and contract, has hampered the work of commissions who have their decisions reversed by the courts frequently found. Further, the refusal of the courts to enunciate definite tests of confiscation has prevented systematic, consistent regulation. Yet the courts cannot be condemned for their stand. Definite tests are difficult to formulate, and the very process of law demands that each case be heard on its own merits, and that all parties concerned be given a hearing.

Smyth v. Ames, 1898, is the classic case in dealing with the rate level. It has been discussed previously. The rules of "fair value" and "fair rate of return" were laid down, and the factors to be considered in arriving at "fair value" and "fair rate of return" were listed. This decision left the door open for the adoption of any

method which could be shown to arrive at "fair value" and "fair return."

The Southwestern Bell Telephone Company case of 1923 is interesting because of its stress on present costs. Whereas the company in Smyth v. Ames favored original investment cost, the company in this case favored reproduction cost. The position of the regulatory bodies was the opposite to that of the company in each case. The 1898 case came after a long decline in the price level; the 1923 case came after a long rise in the price level. In the 1923 case, the Supreme Court found the commission 1/ valuation of the property of the Southwestern Bell Telephone Company too low, especially since only 5.65 per cent return on the rate base was allowed. The commission had appraised the property in 1914, 1915, and 1916, and had added additions and betterments at actual cost to the appraisal value determined. The majority of the court held that the price level rise was not taken into account by the appraisals, that such appraisals should be made at the time of investigation, that "estimates for tomorrow cannot ignore prices of today." Justices Brandeis and Holmes agreed

---

1/ The Public Service Commission of Missouri.

that rates were confiscatory, but dissented in the reasoning. They maintained that the rate of return was too low to earn an adequate return on the prudent investment. Justice Brandeis proposed the prudent investment method in valuation, and found "the rule of Smyth v. Ames legally and economically unsound", as well as impractical in application. He proposed allowance of reasonable costs, including the cost of obtaining capital, as a test of confiscation.

The Bluefield W.W. and Imp. Co. v. W. Va. case of 1923 dealt with the rate of return. Here the court found that the rate of return should be high enough to safeguard the credit of public utilities, and to enable them to secure funds from both stocks and bonds now, as well as in the future.

In McCardle v. Indianapolis Water Company, 1926, the Supreme Court again stressed the importance of present prices in fixing a rate base. Justices Brandeis and Holmes again dissented pointing out that Smyth v. Ames did not stress reproduction cost.

In the Los Angeles Gas and Electric case, 1933, the Supreme Court upheld a commission valuation based upon original cost. The Court pointed out that it was not the method so much as the result that was important as a

confiscatory test. Also, it was pointed out that reproduction cost had been considered, and that original cost yielded a relatively high valuation in view of the decline in the price level. This decision seemed to allow commissions to use any reasonable method, without having to follow the procedure outlined in Smyth v. Ames.

However, the matter was not so simple, and the case of Chesapeake and Potomac Telephone in 1935, beclouded the legal concept of fair value again. In this case, a commission had been using index numbers applied to original cost in fixing rate bases. The index used was obtained by special reference to its applicability to public utilities. This valuation method led to no litigation during the 1920's when prices were generally tending upward. But in 1933, the commission, according to its index, ordered rate reductions in rates of the concern named above. The company took the case to lower federal court which allowed original cost. The commission appealed to the Supreme Court. The Court found that index numbers only "confuse the problem" of valuation and "increase its difficulty". Value should be a "matter of sound judgment, involving fact data," these data being original cost, reproduction cost, and others, seeming to throw the

whole question of fair value back to Smyth v. Ames. Three justices dissented, and Justice Stone, one of them, declared that price indices are just as reliable as engineers' estimates, if not more so, and certainly gave less variable results.

Recent cases have tended to give commissions more leeway in the matter of fixing the rate base, and the courts have ruled that commissions are free to use any method in arriving at a rate base and are bound by no formula in so doing provided that the rates they set are not confiscatory. These cases were referred to in Part I. 1/ Whether this ruling will reduce litigations remains to be seen. The attitude of the commissions seems to be one of hesitancy in using the increased power implicit in the ruling.

The effects which the Smyth v. Ames dictum has had upon public utility regulation are outlined effectively in a recent volume on public policy. The words of the writers are reproduced here:

"Over the years and out of a welter of disputes, two methods of valuation have received the most attention and support: original cost or prudent investment, and present or reproduction cost. Both methods have their staunch supporters. Among regulatory commissions, however, the Smyth v. Ames ruling of the Supreme Court has forced the use of a hybrid method of calculation of the earnings

---

1/ See supra., p. 45.

base. One authority calls this the 'trance' method, and describes the process as follows. The commission examines the evidence relating to reproduction cost and prudent investment. It views the evidence with respect to intangible value and considers the condition of the property. Then, arriving at a judgment which defies analysis or description, it produces a valuation figure which bears no relation to any figures appearing in the evidence it has reviewed. This process is accompanied by denials of the use of formulae or compromise, and an expression of the commission's inability to explain just how it reached the final figure. The whole process, it appears, is an obvious attempt to counter with vagueness the Court's lack of clarity in it Smyth v. Ames pronouncement." 1/

The same writers continue later:

"The important point is that there is great controversy over the vital problem of valuation, and the Supreme Court has not brought order out of the chaos it created in its Smyth v. Ames pronouncement. At times, it has seemed to favor present costs. At other times, prudent investment has caught its fancy. At no time, however, has it been forthright and prescribed a definite rule of valuation which indicated the precise weights to be accorded the various elements considered in arriving at a valuation figure. Consequently, regulatory commissions toss all the different value elements into the hopper, turn on the power, and turn out a valuation figure which they hope will appeal to the judiciary as just and reasonable. This is hardly a satisfying method from anyone's viewpoint. It certainly does not add to the popularity of public regulation, and it may lead the public to by-pass regulation for public ownership as a solution for the failures of competition." 2/

To summarize, the rule of Smyth v. Ames prescribed the elements to be considered, but failed to suggest valuation methods. Inconsistency and vagueness have

---

1/ Purdy, H.L., Lindahl, M.L., Carter, W.A., Corporate Concentration and Public Policy, p. 626.

2/ Ibid., p.627

necessarily followed. The two basic valuation methods have served as limits. The Supreme Court has consistently refused to sanction a "fair value" below original cost, and has favored reproduction cost whenever this was higher than the original cost. In any event it seems that present cost must in some way be considered.

The lower courts and the commissions have made their rulings with an eye to the probable attitude of the Supreme Court. The commissions, if anything, have tended to favor original cost, but have had to modify their valuations to make them acceptable to the courts.

G. CANADIAN RATE CASES

In Canada, rate cases are fewer in number. The valuation problem and the rate level question have been prominent in three recent cases.

In Nova Scotia, hearings were conducted with respect to rates charged by electrical utilities in 1943 and 1944. The controversy between original cost and reproduction cost was fought out during the hearing until the legislature of the province took the matter into its own hands. In the middle of the hearing it passed a statute prescribing original cost as the basis of valuation. 1/ Such interference by a legislature with the work of a commission is rather unusual.

In British Columbia, original cost was adopted by the commission in dealing with the B.C. Electric Company. 2/ The commission regarded the rule of Smyth v. Ames and other American decisions as having only "educational value". "Commissions and courts in the United States are bound by legislative restrictions which do not apply in Canada and must not be too closely followed. To be influenced by past American practices

---

1/ Hill, Kay, "The Rate Valuation Issue Reaches Nova Scotia," Public Utilities Fortnightly, Vol. 33, No. 6, March 16, 1944, pp. 356-360.
2/ Currie, A.W., "Rate Control of Public Utilities in British Columbia", op. cit., pp. 381-390.

(reproduction new) which are now likely to be abandoned would be a grave mistake." 1/ A unique feature of the case is the use of interest credit on depreciation reserve. 2/

In Alberta, a recent case is an inquiry by the commission into rates charged by The Valley Pipe Line Company Limited, in 1944. 3/ Reproduction cost was used in determining the rate base. The question of profits in excess of the allowed return received much attention, and in the end the Board made the decision that "excess profits should be considered for the purposes of rate making as money available for return to the shareholders as a repayment of capital, and should therefore be deducted from the rate base." 4/ Depreciation in connection with depletion also received much attention, the company claiming a fixed rate base with little or no reduction for depreciation. The Board ruled that depreciation be deducted.

1/ Currie, op.cit.,p.382
2/ Ibid., p. 385.
3/ Order No. 10000, File P.U. 4871, Board of Public Utility Commissioners.
4/ Order No. 10000 above, p. 89.

PART III

SUGGESTED PROCEDURES

The previous discussion has indicated that there is no one method of fixing the rate level which can be considered highly satisfactory. In this section it is proposed to examine some of the merits and demerits of the alternatives, with the major emphasis upon original cost and reproduction cost. Further, the function of the rate base in rate control is discussed. Some proposals for rate regulation which would mean relatively less attention being given the rate base are outlined, proposals which in some respects have implications beyond the rate level.

A. ALTERNATIVE DETERMINANTS OF THE RATE BASE

The two methods of determining the rate base, reproduction cost and original cost, have been explained. Basically, the latter yields a fixed rate base, while the former yields a fluctuating rate base. The conflict between the two in actual practice arises because of price fluctuations. There are other methods of rate base determination, but they are essentially adaptations of the two. The split-inventory method, in the final analysis, yields a fixed rate base; the index number method yields a fluctuating rate base. In order to discuss more fully the two parent antagonists, these two may be disposed of here.

The split-inventory method is a compromise arrangement, which would in effect mean the adoption of an original cost basis and a fixed rate base. However, if the property is appraised during a period of high prices, a permanently high rate base may be fixed, to the detriment of consumers; conversely, if appraisal takes place during a period of low prices, original investors may lose forever part of their investment.

The index number method is also a compromise, and it is supposed to give the results of the reproduction cost method, and with much less effort. On the surface,

this method seems commendable because of the ease of making adjustments with the movements of the general price level. It is subject to a serious objection. An index number is a statistical measure, applicable to a group, but like statistical measures in general it is dangerous to apply it to particular cases. 1/ It may serve as a check on actual appraisals; in any event, it is generally felt that it cannot take the place of an honest appraisal of the particular property, even though the latter is based on estimate and judgment.

In the end, then, we are thrown back upon the measures of original cost and reproduction cost, or more basically, a fixed and a fluctuating rate base. Original cost, actual cost, historical cost, prudent investment, and fixed rate base are used synonymously; reproduction cost and fluctuating rate base similarly. 2/

1/ It is probably this which led the American Appraisal Company to say in Clients' Service Bulletin, April 20, 1933: "Construction cost indices, like those for crop production, automobile accidents, life-mortality tables, etc., are interesting indicators of general movements, but are misleading if applied to a particular building, farm, automobile, or human life." See Bonbright, op. cit., p. 167, footnote.

2/ Bauer and Gold use "fair value" and reproduction cost synonymously since both lead to variable rate bases. This usage is adopted here too, present procedures having so far yielded variable rate bases. See Bauer and Gold, op. cit., p. 373. Replacement cost is a term often used instead of reproduction cost.

In discussing the two methods, certain standards or criteria need to be stated. Bauer and Gold seem to be the only writers who have laid down definite criteria which can be used as guides in selecting a rate base. They say in regard to these criteria: "They are axiomatic and therefore need not be supported by analysis and demonstration. If utilities are to be regulated at all, the methods adopted should at least comply with these six standards." 1/ Accordingly these criteria will be used here. A summary of them in the words of the author is as follows:

" 1. The rate base, with the entire method of determining the return, must be capable of systematic administration.
2. It must provide for definite protection of both investors and consumers.
3. It must maintain the financial stability of the companies to the extent possible through rate control.
4. It must make available new capital as needed for public service, but prevent dislocation or distortion of capital additions.
5. It should encourage progressive development in the industries and service to the public.

1/ Bauer and Gold, op. cit., p. 372. The treatment of the two authors is followed substantially in the subsequent discussion, but other view points are introduced throughout. Bauer and Gold are really arguing for the adoption of the original cost basis. Nevertheless, their criteria are acceptable, and form convenient points around which to centre discussion.

6. It should provide rate flexibility for development purposes and permit accumulation of reserves in prosperous years for stabilization of rates and return when earnings decline." 1/

The first three together involve the administrative aspects of control; the last three involve "fundamental economic forces which must be harmonized with general policy."

1/ Bauer and Gold, op. cit., p. 371.

B. A COMPARISON

1. Systematic Administration of Rates

"The first test of a suitable rate base for effective regulation in the public interest appears in ease or difficulty of administration. This centres particularly upon the relative definiteness, reliability, promptness, convenience, and expense involved in determining the amount used for rate adjustment....." 1/

Ease of administration depends upon clear, precise measurements and upon the reliability and the availability of facts. Under original cost valuation can be kept up to date by accounting principles; the quantities involved are susceptible to fairly accurate measurement, eliminating many disputes. The only expense is the cost of regular accounting procedure and systematic supervision by the regulatory body. Rate stability is achieved, if this is a merit; consumers, however, though they like lower rates, object to higher ones. Bickley suggests that the time and energy of employees and officials now engaged in defending valuations could be used to promote efficiency and development if the original cost method of valuation were adopted. 2/

1/ Bauer and Gold, op.cit.,pp.373-74
2/ Bickley, J.H., "Public Utility Valuation for Rate Purposes", American Economic Review, Volume 16, 1926, pp. 28-46.

Bauer suggests that commissions, too, would have more time which could be used to advantage in dealing with capital expenditures, security issues, and operating expenses, and rate structures. 1/ Long, expensive controversies when periodic or occasional appraisals are to be made can be avoided. 2/

On the other hand, original cost may be difficult to ascertain where proper accounts are not available. This would be the case in many older companies; newer companies are apt to have adequate and proper accounts. However, the physical inventory method can be used; estimates can be made from price data. 3/

The reproduction cost method raises many administrative difficulties. The ascertainment of cost is based upon appraisals; these are estimates both as to the techonological and the economic aspects. There is the question of what prices to apply, present, "normal" , or future ones. Further, the procedure is long and expensive. 4/ Repeated valuations are required; these add to the expense to be borne ultimately by the consumers

---

1/ Bauer, op. cit., p. 330.
2/ Bonbright, op. cit., p. 1085.
3/ Bigham and Jones, op. cit., p. 200.
4/ Often expenses of valuation amount to 1% of the valuation itself. See Koontz, op. cit., p. 321.

Indefiniteness in regulation is created; nobody knows exactly how things stand, be it the public utility interest or the delay, and further litigation and expense may follow. 1/ Further, every future adjustment involves new estimates giving rise to new conflict.

Indefiniteness has given the courts a prominent position in regulation; commissions have found that they have to adopt judicial procedure, making hearings long, detailed, and expensive. 2/ Also, commissions cannot look after every case adequately. Lengthiness of procedure also may render the final decision untenable in view of changed conditions; new litigations occur, and a vicious circle is set up. Also, past experience has shown that rates have not been adjusted promptly with the price level. Bauer and Gold not only very definitely denounce reproduction cost as a method which can satisfy the criterion of systematic administration but go farther. They say, "Under reproduction cost rate control goes almost inevitably by default. It is blocked and deadlocked by procedure. Commissions simply cannot handle the work required for systematic adjustment." 3/

1/ Bauer and Gold, op. cit., p. 378.
2/ Present procedures tend to favor a fluctuating rate base, determined by appraisals.
3/ Bauer and Gold, op. cit., p. 382.

2. Protection of Investors and Consumers

Regulation has been undertaken primarily to protect the public from the effects of monopoly. At the same time investors have to be considered. In order to give definite protection to both classes, valuation procedures should be methodical and systematic, and should furnish a reliable indication of what investors and consumers may expect. Speculative practices in the utility field after the first world war led to inflation of security values, and holding company organization pyramided capital structures. When the collapse came in 1929, investors lost heavily, while manipulating groups were able to maintain a large part of their gains. By imposing proper standards of regulation and routine control of investment, such speculation can be avoided.

Consumers are harmed by excessive rates under the present procedures. The large amount of time and energy spent upon valuation prevents regulatory bodies from devoting much time to individual service rates. Scientific studies have shown, for example, that consumers could enjoy much cheaper electricity. 1/ Further, the present procedures are expensive and are ultimately charged to consumers. Finally, neither commissions nor

---

1/ Bauer and Gold, op. cit., p. 386.

consumer groups have had the funds to deal with consumer interest. Bauer and Gold emphasize that the system of control must "define rights precisely" and "establish exact standards and processes of regulation." Their contention is that present "fair value" methods, which they use synonymous with reproduction cost methods since both lead to a fluctuating rate base, have done nothing of the kind.

It is contended that the prudent investment method would measure the sacrifice of investors, and consequently protection of investors can be made more definite. "An investor wants first of all a fair return on his investment and not a fair return on some figure above or below his investment." 1/ Risks to the investors would also be reduced by the greater definiteness and stability of regulation procedure obtainable by the prudent investment method. Consequently consumers can secure lower rates. 2/ The actual investment made by an investor is generally the amount upon which he expects a return. Bonbright stresses this advantage of prudent investment also. Under reproduction cost methods, investors have to gamble on future valuations. However, "the prudent investment

---

1/ Bigham and Jones, op. cit., p. 203.
2/ Ibid., pp.204-205

principle ... will not remove the speculative feature from utility stocks; but it will at least minimize it." 1/ On the other hand, it would seem that under original cost, consumers take the risk that rates will not fall when money income falls.

Besides the objections to present procedures noted before, various other objections to reproduction cost may be noted. First, since the rights of investors would never be defined, there would be continued litigation instead of effective regulation. More specific is the objection that it is possible for persuasive public utility counsel to secure the inclusion of items which do not properly belong in the rate base. Further, it is possible also to secure excessive valuation of items that do belong. 2/

Again, it seems that the fixed rate base would achieve greater definiteness in meeting expectations of investors and consumers.

1/ Bonbright, op. cit., p. 1085.
2/ Bigham and Jones, op. cit., pp. 228-229.

3. Financial Stabilization

It is claimed that the reproduction cost method will give investors a stable real income, and that consumers will pay rates commensurate with the price level. 1/ Such a scheme would ensure the financial stability of the industry regulated. The position taken needs some scrutiny.

Generally, only common stock yields a fluctuating return. The reproduction cost method should ideally make this return higher during high price periods, and vice versa. Thus the purchasing power of dividends would remain the same. Bonds and preferred stock yield fixed returns, and investors do not expect that the returns will vary with the price level. Attempts to make them do so, have not met with success. 2/ Hence, adjustment of return for these investors is not an orthodox procedure, and is not necessary to attract fixed return capital.

Evidently, the capital structure of a company is significant here. If capitalization is chiefly common stock, the reproduction cost basis seems valid; if the common stock equity is relatively small in relation to

---

1/ See Bonbright, op. cit., p. 1087. Bonbright merely outlines the argument.
2/ Stevens, W.M., Financial Organization and Administration (1934), pp. 54-55.

total capitalization and fixed liabilities, reproduction cost, if applied consistently could lead to extreme instability. The capital structures of most public utilities tend to conform to the latter pattern. Bauer and Gold suggest that for public utilities as a whole two-thirds of the investment consists of fixed return securities, and if holding company systems be included, the figure would approach 90 per cent. 1/ Since common stock forms a small proportion of the amount of the capital structure, reproduction cost would not be necessary to yield a fluctuating return. Adjustments are possible under prudent investment to provide a return in keeping with the price level. 2/ But reproduction cost may secure results which are highly undesirable to common stockholders, and also to other investors. This can best be illustrated by taking an hypothetical example.

Assume an investment of $20,000,000 in a public utility, 50% of which consists of bonded indebtedness at 5%, 3/ 25% of common stock. Assume further a rate of return of 7%, allowed by regulation. The return would

---

1/ Bauer and Gold, op. cit., p. 390. See also Guthmann, H.G., The Analysis of Financial Statements, (New York, 1942), pp. 326-328.
2/ Bauer suggests the procedure in his book, Effective Regulation of Public Utilities, pp. 126-128.
3/ This seems to be the average bonded indebtedness of public utilities. See Guthmann, op. cit., p. 327.

be $1,400,000, assuming the company makes neither more nor less, through efficiency measures. Bondholders would be paid $500,000; preferred stockholders $300,000; and common stockholders would receive $600,000 on a $5,000,000 investment which would mean a 12% return on the investment.

Now let the price level increase by 25%, and the property of the company is valued accordingly at $25,000,000. Since the general level of the interest rate will also have increased, the fair rate of return is increased to 8%. The total return will now be $2,000,000; the bondholders and preferred stockholders still receive the same amount, namely, $800,000. Common stockholders would receive $1,200,000 on an investment of $5,000,000 or a return of 24%. While prices rose only 25%, the return to common stockholders doubled. This is not so unusual a return on common stock, but it seems undesirable to have widely fluctuating returns in a regulated industry. Conversely, let the price level decrease by 25%, the property now being valued at $15,000,000, and the rate of return fixed at 6% in accordance with the movement in the general interest rate. The return is now $900,000, that is, 6% of $15,000,000. The fixed return investors receive $800,000 as usual;

$100,000 is left for the common stockholders, a rate of return of 2%. In this case, while the price level decreases by 25%, the return to stockholders would shrink to one-sixth of the original return. If the price level were to drop even more, the preferred stock return would be jeopardized, and in the extreme case, the bondholders' return. The results depicted would be further aggravated by narrower common stock equities in the capital structure.

The conclusion to be drawn from the above is that the reproduction cost method, applied consistently, would lead to financial instability. Where large common stock investment is characteristic of public utility capital structures, however, the reproduction cost method would have much to commend it on this point.

The financial distortions pictured above have not become evident under present procedures because valuations have not been changed promptly in agreement with the price level. Evidence of such distortions became more apparent after 1929, when companies had to face depression conditions with inflated capital structures. 1/ The refusual of the courts and the reluctance of commissions to sanction valuations below original cost have no doubt helped to prevent extreme downward fluctuations in return.

1/ Bauer and Gold, op. cit., p. 393.

4. Provision for Capital Needs

The capital needed for public utility construction and development comes from private sources. Consequently, if the rate base means anything in regulation, it should be determined so as to attract capital when needed.

Reproduction cost, it is claimed, constitutes an acceptable measure of competitive value, and is therefore the proper basis for rate determination. 1/ Because of this it also maintains a proper balance between regulated and unregulated industries, providing for the right amount of investment in each group. That the ultimate result is the achievement of competitive prices, the "right" prices, in the rates is implicit in the position taken. The arguments supporting this position are accordingly set forth.

In unregulated industry, demands for the products produced are reflected in the demands for new capital in the competitive money market. New capital is accordingly allocated according to the demand for products, and in an automatic fashion. Further, as the price level changes, capital values fluctuate with the price level. Earning power is enhanced during a

---

1/ Graham, W.J., Public Utility Valuation.

period of rising prices, and therefore all capital expenditures, old and new, rise in price; the converse would be true during a period of falling prices. There is thus a correlation between the value of investment and prices; that is, between producers' goods and consumers' goods. Consequently, under normal competitive conditions reproduction cost is a better measure of the value of a concern than original cost.

Those who favor the reproduction cost method of valuation in regulation, tend to regard rate control and regulation as a substitute for competition. Therefore they argue that assumed competitive conditions should be applied. Since the value of a concern shifts with the price level under competitive conditions in unregulated industry, therefore similar shifts in value occur in regulated industry which must obtain its capital in an economy which is competitive. If reproduction cost is not adopted for valuing regulated properties, there will be disharmony in the flow of capital as between the two segments of the economy. Under the fixed rate base, capital flow into regulated industry would be checked during a period of rising prices, and regulated industry would be prevented from

developing according to consumer demand. The converse would be true during falling prices. Reproduction cost would ensure the automatic regulation of the flow of capital funds according to consumer demands, and the fundamental problem of the economic allocation of resources would be solved.

Bauer and Gold point out that when regulation is undertaken, the competitive conditions of the economy are modified, and the automatism of competitive forces is disturbed. "The need of new capital must be determined according to growth of population, expansion of industry, and social objectives rather than through an artificial mechanism deemed to be doing substitute work for the absent forces of competition and private initiative in ordinary industry." 1/ Public utilities, are deemed to provide indispensable service, and consequently capital needs should be provided for in accordance with the desiderata mentioned. Granting that reproduction cost does allocate capital properly automatically, the basic objection to reproduction cost still remains, to wit, the difficulties encountered in its determination which is not an automatic process. The dilemma posed is that reproduction cost is a measure

---

1/ Bauer and Gold, op. cit., p. 399.

of prices and hence provides an automatic guide for capital investment, but the determination of reproduction cost is not an automatic process. The claim that reproduction cost allocates resources economically can be questioned; the automatism of the capital flow and of price adjustments can also be questioned. For the present the former assumption will be unchallenged, to be dealt with in the next section; here the latter will be considered, and it is the ground upon which most advocates of prudent investment attack reproduction cost. Bauer and Gold who have crystallized the arguments of this group maintain that fact and theory do not agree. The whole economic system continues to display rigidities in adjustments. Consequently there is too much capital in some industries, and too little in others. In order to deal with these dislocations, policies of control are needed; before such policies can become capable of intelligent execution, needs must be ascertained from the desiderata they list in the quotation above. The contention seems to be that the policy capable of being administered most simply and systematically should be chosen. New capital investments can be obtained in the market at the time they are needed; the price at which they can be obtained depends upon the expectations of investors. The assurance of return and stability of

administration of prudent investment would facilitate the obtaining of capital.

In short, under prudent investment, the reasonable expectations of investors would be lived up to, subject to the physical and technological hazards inherent in any given enterprise, and which are assumed to be taken into account by investors in their reasonable expectations. The question rather is when and how much is "needed" in the utility in question as compared with "needs", elsewhere in the economy. It is granted that the speculative type of investor will not perhaps be so ready to invest, but actual experience seems to indicate that there is no difficulty in securing capital from investors who seek a more fixed return.

There is the claim that during rising price periods, capital would not be forthcoming under prudent investment. During such a period it may also be necessary to expand the business of any given utility. In order to obtain capital it would be necessary to pay a higher price for new capital by increasing the rate of return, but this need not mean that existing investors need be given a higher return. The higher price of new investment need not be excessively high because of the comparative safety engendered by the stability and consistency of

regulation. During a falling price period, it may seem that too much would be invested in public utilities (or regulated industries in general) if prudent investment is used. But additional investments are not made unless the regulating authority sees the need for them. Also, investment during such a period has advantages such as lower interest rates and lower construction and development costs.

Finally, the prudent investment method may have a stabilizing influence upon the economy as a whole. If it discourages investment during booms, and encourages it during depressions, the severities of the fluctuations attendant to these periods may be alleviated. 1/

It seems that the administrative aspects overshadow the economic ones in this whole question of capital investment. In the economic sense, reproduction cost still strikes one as being superior if the administrative

---

1/ This statement must necessarily be qualified. Incomes vary with booms and depressions, and consequently expenditures vary. On the whole, the demand for public utility services is relatively inelastic. Rigid public utility rates would therefore tend to make expenditures on other services and commodities even more variable. This might offset, partly offset, or more than offset the investment effect mentioned.

difficulties were absent. In any event, there appears to be no difficulty in attracting capital under either a fluctuating or a fixed rate base.

5. Incentive to Progress

The question of incentives was dealt with in connection with the rate of return. It is desirable to encourage efficiency which provides better service at the same or at lower rates. Regulation in itself interferes with the profit motive by its restriction of profits, and thus tends to check efforts to achieve greater efficiency. Regulating bodies must also assume responsibility for many decisions made in operating a public utility. This tends to stifle initiative on the part of controlling investors and management.

The kind of rate base used does seem to affect the factor of incentives. Graham holds that reproduction cost would give greater incentive to managerial efficiency. Management would seek to build during low-price periods when construction costs are low. 1/ This argument seems to be questionable; for one thing, public utilities often have to build during high price periods to meet increased demand for their services; for another thing, the same result could be achieved by the prudent investment

---

1/ Graham, W.J., op. cit., p.16

method if regulators controlled and directed building policy. Bauer and Gold admit that reproduction cost furnishes a lag in administration so that economics of progress may accrue to the company for a longer period. 1/ On the other hand, reproduction cost introduce uncertainties not only as to price level changes, but also as to future valuations, and administrative policy. These factors can stifle initiative. Prudent investment implies greater and more detailed control over the company's affairs, and management may come to lean more and more upon the regulatory body in making decisions.

There is more room for inducing efficiency and initiative in the rate of return. Perhaps greater attention to the rate of return and to the rate structure would bring out some satisfactory methods of dealing with incentives. It is suggested that the adoption of prudent investment would not only lower valuation costs, and lead to stable and systematic administration, but would also save the time and energy of company employees and officials engaged in defending valuations, and of regulators, time and energy which could then be devoted toward promoting efficiency and development. 2/

1/ Bauer and Gold, op. cit., p. 415.
2/ Bickley, op. cit.

6. Flexibility of Rates and Stability of Return

"The returns to investors should be independent of the rates charged at a particular moment and of the earnings currently realized under given rates and business conditions." 1/ This statement would lead one to the idea that the rate base has only long-run significance; that the rate base is an expression of the "normal price" of competitive economic theory. It forms a springboard for de Chazeau's attack upon the rate base as a determinant of rates, a topic which is discussed in the next section. 2/ In any event, Bauer and Gold make rate flexibility accompanied by stability of return one of their criteria to be used in selecting a rate base method. Administratively, prudent investment has the advantage again over reproduction cost. Under present procedures, past deficits or surpluses are not taken into account, except to indicate whether rates should be increased or decreased. Constitutionally, a utility is not entitled to more or less than a fair return on present value, and thus adjustments for past deficits or

---

1/ Bauer and Gold, op. cit., p. 418.
2/ See infra., p.209

surpluses cannot be made. The adoption of prudent investment would provide for "continuous accounting between the public and the utilities." 1/

Further, by provision for recouping of losses which might be incurred, rate experimentation would be undertaken more readily by management to find out to what extent extension and intensification of service is economically possible.

The means by which rate flexibility and stability of return could be achieved are stabilization reserves. Surplus earnings in good times could be set aside for times when there are deficits. If these do not occur, rates can be adjusted and savings can be passed on to the consumer, or if the price level declines, rate reductions may be given.

7. The Institution of a Fixed Rate Base

The fixed rate base is now favored by the more prominent economists who have to deal with rate regulation. 2/ Its administrative advantages are overwhelming, and the general feeling of dissatisfaction with the expense, complexity, and often ineffectiveness

---

1/ Bauer and Gold, op. cit., p. 418.
2/ Bauer and Bonbright favor this rate base. Others are Bigham and Jones and de Chazeau.

of present procedures has much to do with the favor with which it is now regarded by public utility economists and administrators. One is inclined to think that the whole controversy between prudent investment and reproduction cost is largely barren; that the issue in regulatory methods is not rate base determination but lies elsewhere. This idea is explored presently.

The institution of a fixed rate base would have to be implemented by legislatures. Policy and administrative procedure would have to be formulated precisely by statute. Commissions would be left with the task of administration. However, the constitutional question remains; companies could still appeal to the courts if they felt themselves aggrieved. This could easily disturb the consistency of regulatory procedure just as it does now. This is a real difficulty which cannot be dealt with summarily in the Anglo-Saxon countries at least. The question of treatment of existing and future investments also becomes relevant. Negotiations would have to be undertaken in dealing with the existing investors; future investors would present no immediate problem. A complete discussion of the variety of problems that would arise with the

adoption of a fixed rate base is given by Bauer and Gold. 1/ Most of these problems are of a legal and accounting nature and will not be dealt with further.

1/ Bauer and Gold, op. cit., Chapters XVIII and XIX

C. THE FUNCTION OF THE RATE BASE

Despite the attention given the determination of the rate base in regulation, one finds few explicit references as to the function the rate base performs. Presumably, it should serve first, as a base from which service rates are to be calculated, and second, as a measure of the constitutional protection given to investors. One suspects that the rate base procedure grew out of the constitutional requirement that property shall not be confiscated without due process of law. Therefore, fundamentally, the rate base is a device which measures the protection given investors. Price level fluctuations involved the parties concerned in the controversies of a fixed or fluctuating rate base, the meaning of value under regulation, and whether actual investment or present value of the property is a criterion of the investors' equity. Implicit in all this is the idea that the first step in actual rate-making is being made; the use of the word "rate base" bears this observation out. One writer says, "And yet the underlying assumption .... is that the rate base is an active factor in rate determination, a base from which service rates are to

be calculated by some clerical or purely administrative process." 1/ Though such an explicit reference to the function of the rate base cannot be imputed to any prominent authorities on rate regulation, yet in actual practice it seems that the determination of a rate base is a major process receiving the most laborious attention, while actual rate-making is a minor consideration that can be attended to at a lower administrative level.

De Chazeau, the writer quoted above examines the nature of the rate base in two articles, the first seriously questioning the relevance of the rate base in setting actual rates, while the second is a reply to a comment on the first article by Bryan and Lewis. 2/ The whole discussion is both timely and intriguing for both purposes and methods of regulation are considered. It is deemed worthwhile to summarize the main points of the discussion here.

1/ de Chazeau, M.G., "The Nature of the 'Rate Base' in the Regulation of Public Utilities," Quarterly Journal of Economics, Vol. LI, 1937, pp. 298-316.
2/ de Chazeau, M.G., loc. cit. Also Bryan, R.F., and Lewis, B.W., "The 'Earning Base' as a 'Rate Base'," (a comment) Quarterly Journal of Economics, Vol. 52, 1938, pp. 335-345, and de Chazeau, M.G., Reply, ibid., pp. 346-359.

Professor de Chazeau begins with a brief examination of the book of Bauer and Gold on the one hand, and that of Graham on the other. 1/ He thinks that the two volumes "exemplify an impasse in current thought on valuation" which arises from a failure to consider the theoretical basis of appraisal methods of rate base determination. 2/ Bauer's six criteria for the selection of a rate base are summarized, as well as his recommendations, but no attempt is made to appraise his position, such an attempt being considered as irrelevant to the theme of the article. 3/ Graham's arguments are dismissed as being nothing more than the usual arguments for the reproduction cost method. 4/ "These arguments have been raised and answered time and again." 5/ Graham, however, raises the argument which is implied in the use of reproduction cost, namely, that the prices of goods generally bear a close relation to the present value of producers' goods, and that therefore public utility service rates should be determined on a rate

---

1/ Bauer, J. and Gold, N., Public Utility Valuation for Purposes of Rate Control, (New York, 1934), and Graham, W.J., Public Utility Valuation, (Chicago, 1934).
2/ de Chazeau, M.G., op. cit., Vol. 51, p. 298.
3/ Ibid., p. 300.
4/ Namely, greater incentives to managerial efficiency, better economic balance between regulated and unregulated industry, and stabilization of real income of stockholders.
5/ de Chazeau, p. 301.

base constructed according to reproduction cost. This argument "has been inadequately exploited by proponents of the method and never properly evaluated by those of contrary opinion ... Professor Graham touches the issue without a consideration of its theoretical implications." 1/ Thus speaks de Chazeau, and he proceeds to delve into the matter in a way which prompt Bryan and Lewis to say, "Professor de Chazeau's article punctures effectively and, it may be hoped, for all time, the theoretical case for the use of reproduction cost in the establishment of the rate (earning) base." 2/ Accordingly, de Chazeau's position is presented briefly.

The fundamental question from the economic point of view is the validity of using the rate base method to bring about a harmonious adjustment in the allocation of resources as between regulated and unregulated industry. The use of a rate base seems to involve a choice of either prudent investment or reproduction cost as a method of determining the rate base. Granted that the rate base procedure itself is economically sound, how do the two methods measure up in achieving an economically sound rate base?

1/ de Chazeau, p. 301.
2/ Bryan and Lewis, Vol. 52, p. 335.

Even the proponents of the prudent investment method do not claim that it establishes competitively distributed investment in public utilities. At best, they claim it is a weighted average of investment over a period of time; that it gives stability of price and return. It is subject to the objections of price rigidity.

Reproduction cost advocates argue that their method approaches the competitive criterion of correspondence of alternative costs and prices; that is, that reproduction cost gives a reliable measure of competitive value. Implicitly they assume too, then, that competitive value is the best basis for rate base determination.

Under prudent investment, they say, rates are too high when the price level is falling, and too low when it is rising. In the former instance, consumers turn to substitutes or spend too large a proportion of their income on the utility service; in the latter, consumers turn to the public utilities service as a substitute for something else they used to buy or spend too small a proportion of their income on the utility service. In either case there is a maldistribution of scarce productive factors. They maintain that there is a

correlation, however rough, between capital and consumer good prices.

How valid is their position? First, substitution may not be possible even if substitution is possible, it is not inevitable with changing prices. The elasticity of the demand for the service is a factor. If the demand is elastic and substitution is possible, their contention is sound. The objection to prudent investment is valid in itself, for the method of prudent investment cannot even pretend to allocate resources with even roughly approximate economic accuracy. But the point remains, does the reproduction cost method do any better?

It is generally recognized that where fixed investment is large, correspondence between cost and price becomes less. Because of high overheads, such correspondence comes to depend more and more upon volume of production. A public utility service is apt to have relatively stable demand; consequently output is relatively constant. If the price level rises, there is little or no effect upon overhead costs unless new construction is undertaken; the higher cost is reflected in operation expenses which are considered separately from the rate base. Similar considerations obtain if the price level is falling. In other words, there may be a correspondence

between the price of the property and the prices of the goods produced, but such a correspondence is not causal, nor is it close. In the long run, there is more to be said for the degree of correspondence between the two, but even prudent investment, with its weighted average, can approach this. Thus the argument that the reproduction cost method results in a rate base which establishes competitive value or an economic allocation of factors of production among regulated and unregulated industries in accordance with cyclical business movements must be based upon other premises.

The case for reproduction cost advanced above rests upon marginal cost analysis and the principle of opportunity cost. 1/ The principle of opportunity cost operates within the framework of pure competition, and the principle of substitution is necessary, speaking broadly, if the results depicted by marginal analysis are to be attained.

1/ "Maximum efficiency, within the limitations of the theory of maximum satisfaction, is attained when scarce factors of production are allocated among competing uses (within and between industries) in accordance with the relative marginal productivity of those factors as corrected by the marginal vendibility of the resultant product. In this process, opportunity cost - the market value irrespective of actual outlay - must govern the economical employment of any product or any factor of production." See de Chazeau, Vol. 51, p. 304.

If the above conditions were all present, what validity has the reproduction cost method? The concept of "normal value" or cost of production would give it validity for a whole industry. Here de Chazeau seems to say that "normal value" cannot be applied to the individual firm, and hence reproduction cost, being the expression of normal value cannot be applied in valuing any given firm. This seems to be pushing the case against reproduction cost too far. Under pure competition, the marginal cost of each firm would tend to equal price. If one assumes competition with frictional elements present, however, one would find firms with differing marginal costs. Reproduction cost, as expressed by normal value, could not then be applied reliably in valuing any given firm.

In the actual world, monopolistic competition and oligopoly are the characteristic market conditions. The condition of pure competition is absent, the necessary adjuster of an equilibruim which attains the most economical use of resources. 1/ During a period of business depression when the demand for the product of a monopolistic producer decreases, he may maintain or even increase his price if he finds the demand is

---

1/ See supra., p. 12.

less elastic than before. 1/ Thus supply and demand are not adjusted here by the price reduction implicit under competitive conditions. Price stability and unused capacity can exist side by side, and there can be prolonged periods when costs and prices diverge very appreciably.

It has been pointed out before that public utilities are natural monopolies. Perhaps this should be qualified by saying that without regulation, they characterize the market condition of "oligopoly." The encouragement of competition among them led to cut-throat competition, and the emergence of one firm with an inflated capital structure resulting from the absorption of its rivals. Rates accordingly had to be higher to retire the costs of equipment abandoned by consolidation, and to maintain the credit of the company. Wherever consolidation was not permitted, rates had to be higher because by maintaining several firms in the field, the economics of large-scale production and of diverse demand were not available. Hence price competition was not desirable. Under such conditions, "monopolistic" and not "competitive",

---

1/ The producer may do this even though there are other producers for the producers cannot, if they behave rationally from longer range considerations, ignore the behavior of each other.

value obtains. But this value cannot in fairness to consumers be capitalized against them when the utility is regulated. The utility firm is freed from the risks of competion under oligopoly, and cannot expect to retain the proceeds that could be obtained by virtue of the monopoly value. But if reproduction cost of identical plant were adopted as the method of rate base determination to be consistent, monopoly value also would have to be included.

The attempt to use reproduction cost of the service, using the most efficient hypothetical substitute plant would mean trying to obtain a competitive value in a world of monopolistic values. 1/ In conclusion, de Chazeau says, "I conclude that there is no merit in the theoretical case for the use of the reproduction method. Costs economically incurred depend on value but the relation is irreversible whether competition is pure or monopolistic. Since a utility is given a quasi-monopoly and the principle of substitution is largely inoperative, service rates may be determined from the reproduction cost of its property, but the so-called rate-base is a monopoly

---

1/ See de Chazeau, Vol. 51, pp. 308-309.

valuation, not a 'competitive value'. It assures no conformity of service rates with prices in unregulated industries and will not secure an economic allocation of the factors of production among regulated and unregulated enterprises." 1/

But even if reproduction cost has to be rejected, prudent investment must be rejected even more emphatically if one desires to construct a rate base that will allocate productive resources economically in public utilities. Now, as indicated before, these are the two basic methods of determining a rate base, any other methods being merely variants of the two. The conclusion should be clear; the rate base method of rate regulation cannot hope to cope with the problems of price parities and the effective use of capital.

What, then, becomes the function of the rate base? In de Chazeau's opinion the rate base merely becomes an "earning base - a measure of the constitutional protection accorded investors. However, he admits

---

1/ de Chazeau, loc. cit., pp. 309-310. The argument of de Chazeau seems to ignore "rents", or monopoly revenues. The long run and the short run needs to be distinguished; de Chazeau's argument is valid in the short run. In the long run, monopoly revenues become capitalized and incorporated in values of concerns and various productive agents. Also, in the long run, the principle of substitution operates, as productive agents move to or from enterprises.

that it is a limiting factor to rate control in the long run. 1/ Service charges may not be forced down to such a figure that investors do not obtain a fair return, subject to the proviso that management is reasonably efficient.

Nevertheless, what alternative procedure which can actively effect the ends desired can be adopted? The rate base would be retained as an "earning base", the prudent investment method being used to determine it. The reproduction cost method is too expensive, involved, and lengthy. "The case for prudent investment," says de Chazeau, "rests on the explicit divorce of the earning base (erroneously termed "rate base") from service rates. Given this separation, it becomes apparent that the determination of the base, far from a major step in rate control ... is no more than a necessary prelude to regulation." 2/ The emphasis of rate control should be upon individual service rates and their relation to costs, upon closer scrutiny of discriminatory rates and practices, and upon standards of efficiency. The aim would be to adjust rates to link them with prices of substitutes and prices in

---

1/ de Chazeau, p. 313.
2/ Ibid., p.315

general, thus achieving economic allocation of resources and goods. Such an aim can only be achieved if the time and energy of commissions and experts could be diverted to experimentation with and to studies of service rates from the present rate base squabbles. The restriction of profits is not the main aim of regulation; such restriction does not guarantee efficiency of service at the most economical rates, nor does it, to use an overworked expression again, ensure the economic allocation of resources.

Yet, under present procedures, the restriction of profits seems to be the popularly accepted aim of regulation, and the success of such regulation tends to be gauged by its success in this direction. There is no inducement to experiment with rate structures since there is a feeling on the part of investors that to do so would interfere with the earning of the allowed fair return, and on the part of consumers that more than a fair return may be earned. This weakness could be overcome by the establishment of stabilization reserves as recommended by Bauer and Gold. de Chazeau, although looking favorably upon the use of such reserves, attacks the logical position taken by saying: "If the rate base is both a criterion

of investment protected against confiscation and a basis for the mathematical determination of service charges, in strict logic there is no opportunity for any regulating body to set up dividend stabilization reserves from 'excess' earnings to supplement potential deficiencies in earnings." 1/

The main aim of regulation was stated as being the attainment of greater efficiency and progress. To achieve this, regulation has an advantage over public ownership because of the possibility of "stimulation of private initiative directed toward socially desirable ends." 2/ One feels that neither efficiency nor progress is secured by the present emphasis upon the rate base in procedure. There is probably a psychological and institutional aspect which is very influential in maintaining the *status quo* in regulatory procedure; this is the sanctity and respect with which property is regarded by established interests and the law. The final remarks of de Chazeau are not only open to challenge, but are also challenging: "Absorbed in the calculation of a basis for rate determination a pursuit as barren as

---

1/ de Chazeau, p. 312.
2/ *ibid.*, p. 315.

that of the myth of 'fair value' which has so long occupied the courts - regulating commissions have had neither the time nor the funds to establish standards of performance for intelligent control. Multiplicity of rates and rate forms belies a coherent pricing policy. Maximum charges have been whittled down by bargaining under the shadow of litigation. Social and economic ends frequently have been forgotten in the complexities of valuation.

If the analysis in this paper is sound, valuation as an economic basis for rates is another 'gigantic illusion,' and as a measure of investment, it is a luxury which society can ill afford." 1/

1/ de Chazeau, pp. 315-316.

D. ALTERNATIVE COST APPROACHES

It seems appropriate to conclude this discussion of rate level determination by a brief consideration of alternative procedures in rate regulation. The function of the rate base, and hence the rate of return (it being a function of the rate base), as an active agent in rate determination has been seriously questioned. The clumsiness of present procedure with its stress upon valuation has also been noted. Further, in railroad regulation, the procedure is to permit the charging of "what the traffic will bear" with not too fortunate results. It is not proposed to discuss these results here, however. Our concern is with the question of alternative methods which can yield more satisfactory results, and which are at the same time feasible.

Bryan and Lewis bring forth some definite suggestions in their comment upon de Chazeau's article. 1/ They would still retain the rate base, but recommend the prudent investment method as a means of ascertaining the rate base speedily and easily so as to leave regulators free to undertake the real work of regulation. 2/ But they probably admit greater usefulness

---

1/ See the previous topic discussed.
2/ Bryan and Lewis, Vol. 52, p. 344.

of the rate base than de Chazeau, although the latter admits its usefulness as a long-run guide to investment, consumption, rates, and earnings. 1/ The rate base serves as a standard which regulators have to "contrive, loosely and arbitrarily, having regard to 'public convenience and necessity,' "rates being set with the aim of producing returns which will attract and maintain the capital required in the industry, so determined. This procedure is necessary in the absence of an "automatic" index of "proper" investment. The question here is one of the proper investment, and control of investment, and control of investment is an alternative which will be discussed presently.

Rates have to be fixed at such a level that with existent demand, the utility, given reasonable efficiecy of operation, can earn a "fair return" on the rate base. The rate formula would read, "the lowest rates which will produce a fair return on the earning base." 2/ Thus the rate base would impose a level for service rates. The price of substitutes is a relevant consideration too. "Relatively high substitute prices cannot justify utility prices above the earning base level,

---

1/ de Chazeau, Vol. 52, p. 359.
2/ Bryan and Lewis, p. 340.

and relatively low substitute prices will still dictate utility service rates at the level which most nearly meets the requirements (if they cannot be completely met) of the earning base." 1/ Cyclical changes in the price level can be met by either a change in the rate of return or by reserves. 2/ In any event, the rate base is a relevant factor in determining service rates.

How can utilities and commissions determine the lowest level of rates appropriate in a given situation, given the approximate return required and knowledge as to price level conditions, substitute services, and so forth? Bryan and Lewis summarize their program to meet the problem as follows:

"The requisites of any program would seem to be: (1) an understanding of the problem and a general acceptance of low rates and widespread service as a goal ardently to be sought, (2) the availability of pertinent information, (3) power in the hands of regulatory commissions to compel rate reductions, (4) freedom to experiment in rate adjustments, uninhibited by prospects of the cost, delay, animosity and uncertainty characteristic of present-day rate litigation, and (5) the presence of incentives to utility managements voluntarily to reduce rates." 3/

The adoption of the program would mean the application of the "sliding-scale" principle, in rate

---

1/ Bryan and Lewis, p.341
2/ Ibid.,pp.341-42
3/ Ibid., p.343

regulation, a principle dependent upon the freedom to experiment with rates. Indeed, the main emphasis of the plan is upon freedom to undertake rate experimentation. The adoption of the plan, like the others to be dealt with is subject to the attitudes of the courts, commissions, and the utilities themselves, as well as those of the general public. The closing remark of the authors is interesting: "One of the most significant possibilities open to government ownership lies in the opportunity freely to undertake experimentation designed to find the lowest level of rates capable of covering operating and capital costs. Full and intelligent exploitation of this opportunity will have effects reaching far beyond the utility and the consumers immediately involved; it is easily conceivable that, paradoxically, it may point the way to the improvement and perpetuation of regulated private ownership." 1/

In his second article, de Chazeau makes some definite proposals, and his summary is reproduced here:

" 1. Rate policy in the short-run must be divorced from the 'rate base' (i.e. cost-price) philosophy. This requires rate research, a study of demand elasticities and the price of substitutes, and rate experimentation.

2. A far more thoro analysis of utility costs is required, to the end that undesirable monopolistic discrimination may be avoided, a knowledge of existing discrimination obtained, and some standard of permissible discrimination established." 2/

1/ Bryan and Lewis, p. 345.
2/ de Chazeau, Vol. 52, p. 358.

The two proposals above deal with rate control; below, de Chazeau suggests two ways of dealing with the broad problem of control, the prevention of maladjustment in the use of resources:

" 3. From a cyclical point of view, the major source of potential maladjustment is in those classes of service most subject to the competition of substitutes. It would therefore seem desirable that such class rates (including contract rates), so long as they covered their differential costs, should be made to vary over the business cycle roughly with the price or prices of the most adequate substitutes. This, of course, does not imply equality of prices, but rather roughly proportional price variations. Such a procedure is implied in the term 'price parities.'

4. Over the long-run, if other class rates are made to bear their full share of common costs, a maximization of service, within the limits of the property rights of shareholders, in the fields in which the competition of substitutes is least adequate (i.e., broadly, in the domestic and rural field) may be regarded as in the public interest. Public utility services assume the character of social necessities with exceptional social significance in such fields, and the expansion of capital to provide such services is therefore least likely to lead to maladjustment. Required net earnings will limit rate control over a period of years and, with the safeguards indicated in points (1) to (4) above, the earning base may be used in planning to achieve the most desirable long-run trends in investment, consumption, rates and earnings." 1/

The above points seem to indicate a rather complicated and complex scheme for regulation; but then, so is regulation is at present. At least de Chazeau's program would get to grips with the real problem of control

---

1/ de Chazeau, pp. 358-359.

indicated above. The problem would be greatly simplified if merely a "fair return" and no more were sought by the companies, and if competitive substitutes did not exist.

A more radical departure from present procedures is outlined by Bruce W. Knight in a challenging article in the Quarterly Journal of Economics, Volume 44. 1/ Knight contends that control of investment rather than control of return would be a superior method of solving the problem of the economic allocation of resources, the fundamental problem regulation faces. In brief, his thesis is that regulation by control of return attempts to solve an economic problem by technological methods, and accordingly such control is not successful. That is, the technological efficiency of the industry regulated is the guide used in setting a rate of return, regardless of whether there is overinvestment or underinvestment in the industry. Such a method fails to touch the underlying economic problem of establishing equality of marginal productivity among all industries. This can be achieved only by the shifting of factors of production from one industry to another; control of

---

1/ Knight, Bruce W., "Control of Investment versus Control of Return in the Regulation of Natural Monopolies, Quarterly Journal of Economics, Vol. 44 (1929-30), pp. 263-285.

investment would accomplish this shifting. The regulated-return plan of control, Knight contends, tends to assume that investment is at the proper level, thus throwing the solution of the problem upon technological considerations.

The guides of a regulating body would be cost and demand schedules of the products produced by the regulated industries, and information as to the competitive rate of return of unregulated industry. Studies of the shapes and elasticities of cost (supply) and demand curves would have to be made. These studies can be made by the regulatory body as it reduces or increases investment, noting the effects which such changes in investment, have upon costs, demand, and upon the competitive rate of return as investment shifts between regulated and unregulated industry. No more shifting would be effected by the regulators when equivalence in return of unregulated (assumed to be competitive) industry and regulated (monopolistic) industry is obtained. The data as to costs and demand would be used constantly, for regulation would be a continuous process.

Investment would be increased by permitting the issue of more shares; it would be decreased by with-

drawing issues of stock. Knight suggests reimbursing out of public funds all legitimate vested interests. 1/

The organization of Knight's discussion can be indicated. Production and distribution are distinguished, both competitive and monopolistic. The relation between production and distribution is pointed out, the former being a determinant of the latter, but not vice versa. It is here that traditional regulation errs; by control of return, distribution is affected but not production. Monopoly is fundamentally a phenomenon in production; "it is the power to restrict output." The implications of the relationships among the above concepts are worked out. The adherence to the policy of control of return is based on the erroneous idea that monopoly is primarily a phenomenon of distribution, that profits must be kept down. The two approaches to monopoly control are introduced, and a hypothetical model is used to compare the effects of the two. Three cases are considered: under-invested simple monopoly, over-invested simple monopoly, and discriminating monopoly. The superiority of the investment-control plan is established in the case of the first two;

1/ Knight, p. 281.

the third case, is analyzed, and found subject to the same conditions fundamentally as those obtainable under simple monopoly.

One can see that the adoption of an investment-control plan would confront regulators with problems and techniques hitherto unfamiliar to them. Also, the valuation procedure seems firmly entrenched in regulation. Finally, the attitude of the law would probably be one of distrust in view of the bearing investment control might have upon the constitutional safeguards of property. For these reasons the plan probably has not received much attention. More surprising is the fact that one finds only a few passing references to Knight's discussion in economic literature; one looks in vain for thorough-going discussions of the points raised by Knight. Knight's article was published before the new theories of monopolistic and imperfect competition were introduced. The development of these newer theories of market conditions has led to further implications which remain to be worked out in connection with control. Writers like Pigou who discussed control could assume two contrasting conditions, competition and monopoly, and a rigorous analysis could be adequately worked out. The elements of the new theories have

blurred the distinctions between competition and monopoly; concepts like competitive return become elusive, and too many indeterminate equilibria present themselves.

The schemes which have been outlined above would seem to make the rate level less important consideration in rate regulation than is the case at present. The emphasis is upon rate experimentation and statistical investigations of rates as means of obtaining results suggested by modern economic analysis.

E. VALUE OF THE SERVICE

The rate level procedure is fundamentally a cost-of-the-service approach in rate regulation. The value-of-the-service theory implies that rates can be set according to the value of the service. However, the determination of the value of the service seems an even more hazardous undertaking than finding the cost of the service. The position taken by those who advocate this method is that competitive substitutes exist even for public utility services. A consideration of the whole theory is not undertaken here. A quotation from Bonbright may be appropriate: "The mere fact that people are willing to pay the price demanded by the companies indicates that the service is worth to them

the full amount of the charge. This charge may be so extortionate as to be termed a 'holdup' and yet may be well within the limits of the value of the service." 1/

It seems that too much emphasis can be put upon . . . competitive substitutes. On the whole, public utilities provide relatively indispensable services. It is true that consumers will turn to substitutes if prices . . . change in favor of the substitute, and further if it is convenient to turn to substitutes. Wholesale substitution, however, would seem to mean that the service provided by the utility is not indispensable, and it also implies that the utility could cease operating without serious effects upon the community. 2/

F. YARDSTICK REGULATION

In the last fifteen years a proposed new regulatory device has become prominent enough to warrant some attention. This is the idea of devising yardsticks to measure the efficiency of public utility operations and

---

1/ Bonbright, op. cit., pp. 1109-1110.
2/ For a recent treatment of the question of substitutes, see Behling, B.N., "Public Utility Service, Competitive Substitutes," American Economic Review, Vol. 27, 1937. The value-of-the-service theory would mean by-passing the whole problem of a rate base, and indeed, a rate level.

the reasonableness of prices, and also to use yardsticks as administrative means of obtaining the results sought in regulation.

The difficulty that appears in regard to the use of a yardstick as a measurement is that public utility plants operate subject to different conditions throughout the country. It does not seem feasible to apply a yardstick indiscriminately to each individual plant. On the other hand, the yardstick can be used as an administrative device to enforce rates set by commissions. That is, the existence of a publicly-owned utility or the mere threat of constructing a small plant (which could conceivably expand, if necessary) has in several cases brought privately-owned utilities into line. 1/ In such cases, no recourse to the courts to seek reversals of commission orders, could have helped to raise the earnings of the utilities concerned. One writer says that a wider application of the yardstick device could eliminate many court litigations, 2/ and could, indeed,

---

1/ The Ottawa Light, Heat and Power Company reduced its rates to meet the competition of the Ontario Hydro Company, and still found itself able to earn a reasonable return.. In Westmount (Montreal), the construction of a small plant led to rate reductions on the part of the Montreal Light, Heat and Power Company. The T.V.A. is the outstanding example of the "yardstick" in the U.S.A.

2/ Cooper, W.W., "The Yardstick for Utility Regulation," Journal of Political Economy, Volume 51, 1943, pp. 258-262.

make unnecessary the construction of a rate base. 1/ Operating costs, which are variable costs, would become the main concern.

G. PUBLIC OWNERSHIP

It is not proposed to deal with public ownership per se here; it is introduced here as furnishing an alternative to present methods of regulation. Essentially the same cost considerations have to be met under public ownership as under private ownership. Investment still has to come from private individuals in a large measure; the possibility of providing for risks by means of taxation is present. The question of providing incentives to efficiency and initiative is generally considered to be more difficult under public than private ownership. Nevertheless, if present procedures become thoroughly unwieldy, the alternative of public ownership is always present.

1/ Cooper, op.cit.,pp.261-262

CONCLUSIONS

In the popular sense, rate regulation has come to mean the elimination of "excess profits". However, the fundamental problem of regulation has much wider implications; it is one of allocating resources economically. Under perfect competition rate regulation would not be necessary for the pricing process would secure prices in harmony with lowest costs. The presence of monopoly elements not only leads to regulation, but also introduces sloping demand curves which cannot attain tangency with the cost curves at the lowest points of the latter.

There are two points of view to be reconciled in rate regulation, each of which can be represented by two different outputs. It is assumed here that we are dealing with the public utility method of regulation, and that the "fair rate of return" is included in normal costs. It is also assumed that the total cost curve is subject to valuation procedure because valuations influence the fixed costs and hence total costs. Thus the cost curve will be "artificial", but regulators should ideally try to arrive at a valuation and a return that are economically correct. Two difficulties

present themselves, and both have been indicated in the previous discussion: first, since exchange value is invalid as a measure of what a public utility is worth, any valuation made is merely a measure of what regulators permit the utility to be worth; second, since private property is involved and is constitutionally protected, companies have recourse to the courts if they are dissatisfied with commission valuations and rates of return.

Wherever the cost curve is not subject to the influence of regulation, the companies would attempt to produce the output at which the marginal cost equals the marginal revenue. The commissions would attempt to have the companies produce the output at which the average cost equals the average revenue. 1/ Further, the commissions attempt to establish the lowest possible cost curve in determining the rate level. However, since the procedure is non-automatic in its determination of "costs," and since recourse to the courts is possible, the companies can appeal to the latter for a higher valuation and/or a higher rate of return. The ultimate result can well be a raising of the cost curve so that it is tangent to the revenue curve; then marginal cost

1/ It is assumed here that the cost curve and the revenue curve intersect. If they are tangent to each other, no conflict exists, and regulation would not be deemed necessary.

equals marginal revenue, and average cost equals average revenue at the same output, namely, the point at which the cost curve and the revenue curve are tangent. On the surface the two points of view are reconciled; in fact, however, the very purpose of regulation, the most economical output from the point of view of the use of resources has been defeated. The dilemma which the valuation procedure presents should be evident.

However, the economic defect of the valuation procedure has been enhanced by the inconsistencies possible under the "fair value" doctrine of valuation. At one time one finds public utility counsel arguing successfully for reproduction cost; at another time, for original cost as successfully, depending upon the general price level at the time. The commissions have shown similar inconsistencies, though they have tended to favor original cost; this is understandable in view of the long-run rise in the price level since the turn of the century when public utility regulation became prominent. It is significant that during the 1930's when the price level dropped, the courts refused to sanction rate bases below original cost, and that during the 1920's they favored rate bases above original cost. The Supreme Court of the United States has indicated

in recent cases that commissions need be bound by no formula, and it seems, has hinted that it would just as readily as not shift the burden of ultimate valuation upon the commissions. 1/ The commissions have taken a rather skeptical attitude to the court's opinion.

If present procedures, in which rate level determination forms the core of the regulation process, are to be continued, the controversy between reproduction cost and original cost is less important than the question of adopting a form of one or the other, and applying it consistently throughout. One can see no special need for a further study of the two basic valuation methods; each has its merits and demerits; the results secured by either if consistently applied do not seem to warrant an opinion that one is vastly superior to the other. The original cost method has the administrative advantage, and tends to be favored now by most of the prominent public utility economists for this reason. On the other hand, some index number device could make the principle implicit in reproduction cost more workable administratively.

A basic difficulty in public utility regulation is that administrative pricing leads to price rigidity.

1/See supra., p.45

So far, rate determination has tended to lag behind price movements. It is possible that greater freedom of action on the part of commissions could alleviate this condition; to this end, consistent methods and systematic administrative procedures are necessary. But the automatism im licit in the institution of private property precludes a realistic assumption that whatever methods and procedures are adopted can be satisfactory to all parties at all times, and as long as recourse to the courts is possible there appears to be no easy solution.

Another problem is the one of incentives to efficiency; commission regulation necessarily leads to interference with managerial functions. The rate level method of regulation has as yet to develop devices which can deal with this problem effectively. Any solution of this question is itself dependent upon the attainment of greater administrative efficiency.

Some alternative methods of public utility regulation have been outlined. Here there appears to be more scope for fruitful research in the form of statistical studies of cost and revenue conditions, and in the application of economic theory to the data and results obtained. Rate experimentation is essential to obtain complete and accurate data; the general tendency to cling to the <u>status quo</u> in regulation is a real

obstacle to such procedure. The control of investment presents a method which would deal directly with the primary question of production or output. Again, cost and revenue data are necessary for the economic success of such a plan. The control of security issues which co mmissions exercise is a step in this direction; such co ntrol, however, does not deal with investments which have already been made.

The adoption of consistent methods of rate level determin tion appears to be a feasible step in the future. The ch nging attitude of the courts, and the general feeling that present procedures are unnecessarily involved and lengthy and ineffective can influence materially the adoption of methods permitting greater consistency and administrative ease in regulatory policy. However, a final solution of rate regulation demands cost and revenue studies of an exhaustive nature.

The failure of public utility rate regula tion can lead to a policy of public ownership, a policy which is not advantageous in all respects. Conversely, success in public utility regulation can lead to the extension of this method of control to other fields of public policy.

BIBLIOGRAPHY

GENERAL

1. Boulding, K.E., Economic Analysis, Harper & Brothers, New York, 1941.
2. Buchanan, N.S., The Economics of Corporate Enterprise, Henry Holt and Co., New York, 1940.
3. Chamberlin, E.H., The Theory of Monopolistic Competition, Harvard University Press, Cambridge, 1942.
4. Clark, J.M., Social Control of Business, McGraw-Hill Book Company, New York, 1939.
5. Knight, F.H., Risk, Uncertainty, and Profit, Houghton-Mifflin Company, Boston, 1921.
6. Koontz, H.D., Government Control of Business, Houghton-Mifflin Company, Boston, 1941.
7. Pigou, A.C., The Economics of Welfare, Macmillan and Co., limited, London, 1920.
8. Purdy, H.L., Lindahl, M.L., Carter, W.A., Corporate Concentration and Public Policy, Prentice-Hall, Inc., New York, 1942.
9. Robinson, Joan, The Economics of Imperfect Competition, Macmillan and Co., London, 1933.
10. Rufener, L.A., Principles of Economics, Houghton-Mifflin Company, Boston, 1927.
11. Stevens, W.M., Financial Organization and Administration, American Book Company, 1934.

PUBLIC UTILITIES

1. Bauer, John, Effective Regulation of Public Utilities, Macmillan Company, New York, 1925.
2. Bauer, John and Gold, Nathaniel, Public Utility Valuation for Purposes of Rate Control, Macmillan Company, New York, 1934.
3. Bonbright, J.C., The Valuation of Property, 2 volumes, McGraw-Hill Book Company, Inc., New York, 1937.
4. Glaeser, M.G., Outlines of Public Utility Economics, Macmillan Company, New York, 1931.
5. Graham, W.J., Public Utility Valuation, University of Chicago, Chicago, 1934.
6. Jones, Eliot and Bigham, Truman C., Principles of Public Utilities, Macmillan Company, New York, 1937.

7. Nash, L.R., The Economics of Public Utilities, McGraw-Hill Book Company, Inc., New York, 1931.
8. _____ Public Utility Rate Structures, McGraw-Hill Book Company, Inc., New York, 1933.
9. Scharff, M.R., Leerburger, F.J., and Jeming, Joseph, Depreciation of Public Utility Property, A collection of papers, Burstein and Chuppe, New York, 1941.
10. Stewart, A., Alternative Methods of Public Utility Valuation for Purposes of Rate Control, Submission to the Board of Public Utility Commissioners of Alberta, mimeographed, 1945.
11. Wilcox, Delos F., Depreciation in Public Utilities, National Municipal League, New York, 1925.
12. Wilson, G.L., Herring, J.M., and Butsler, R.B., Public Utility Industries, McGraw-Hill Book Company, Inc., New York, 1936.

ACCOUNTING

1. Canning, J.B., The Economics of Accounting, Ronald Press Company, New York, 1929.
2. Guthmann, H.G., The Analysis of Financial Statements, Prentice-Hall, Inc., New York, 1942.
3. Lang, Theodore(editor), Cost Accountants' Handbook, Ronald Press Company, New York, 1944.
4. Lasser, J.K. (Editor), Handbook of Accounting Methods, D.Van Nostrand Company, Inc., New York, 1943.
5. Paton, W.A., (Editor), Accountants' Handbook, Ronald Press Company, New York, 1943.
6. _____ Advanced Accounting, Macmillan Company, New York, 1941.
7. Smails, R.G.H., and Walker, C.E., Accounting Principles and Practice, Ryerson Press, Toronto, 1936.

ARTICLES

1. Behling, B.N., "Public Utility Service, Competitive Substitutes", American Economic Review, Vol.27, 1937.
2. Bernstein, E.M., "Public Utilities and the Income Tax", Quarterly Journal of Economics, Vol.45, 1930-31
3. _____ "The Split Inventory: A War Expedient, A Solution in Peace", ibid,, Vol.44,1929-30

4. Bickley, J.H., "Public Utility Valuation for Rate Purposes", American Economic Review, Vol.16, 1926.
5. Bryan, R.F., and Lewis, [illegible], "The 'Rate Base' in the Regulation of Public Utilities: Comment", Quarterly Journal of Economics, Vol.52, 1938.
6. Clark, J.M., "Railroad Valuation as a Working Tool", Journal of Political Economy, Vol.28, 1920.
7. Colbert, Asel K., "Advantages of Original Cost Classification of Plant", Public Utilities Fortnightly, Vol.35, March 15, 1945.
8. Cooper, W.W., "The Yardstick for Public Utility Regulation", Journal of Political Economy, Vol.51,1943.
9. Currie, A.W., "Rate Control of Public Utilities in British Columbia", Canadian Journal of Economic and Political Science, August, 1944.
10. de Chazeau, M.G., "The Nature of the 'Rate Base' in the Regulation of Public Utilities", Quarterly Journal of Economics, Vol.51, 1937.
11. _____, "Reply", ibid., Vol.52, 1938.
12. Hill, Ray, "The Rate Valuation Issue Reaches Nova Scotia", Public Utilities Fortnightly, Vol.33, March 16, 1944.
13. Knight, Bruce W., "Control of Investment versus Control of Return in the Regulation of Natural Monopolies", Quarterly Journal of Economics, Vol.44,1929-30
14. May, George O., "Further Thoughts on Depreciation and the Rate Base", ibid., vol.44, 1929-30.
15. Ruggles, C.O., "Problems of Public Utility Rate Regulation and Fair Return", ibid., Vol.32, 1924.

LEGAL

1. Decision, In the Matter of the Public Utilities Act and In the Matter of rates charged by The Valley Pipe Line Company Limited, Volume 27, Public Utility Board of Alberta, File P.U. 4871, 1944.
2. The Natural Gas Utilities Act, Statutes of Alberta, 1944, Chapter 4.
3. The Public Utilities Act, Revised Statutes of Alberta, 1942, Chapter 28.
4. Public Utilities Reports, 1915 to date, over 50 volumes.

B29752